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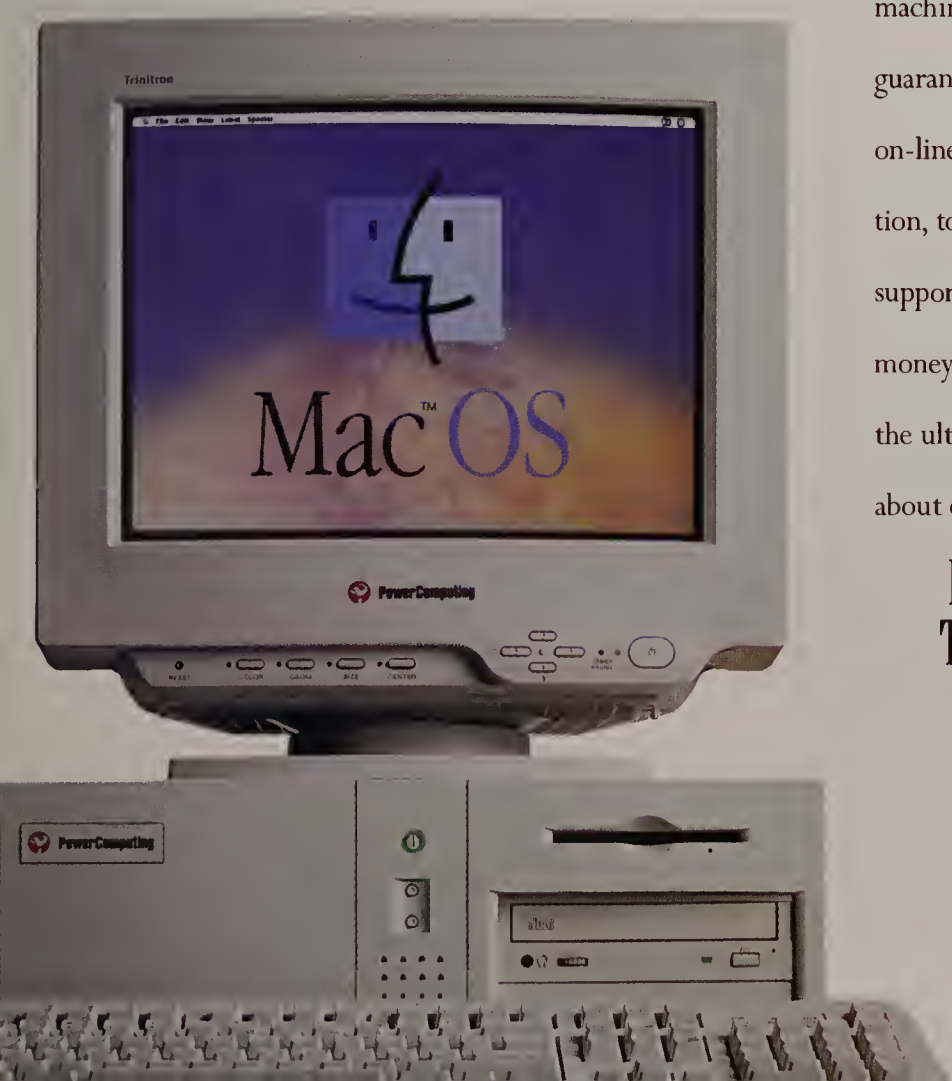

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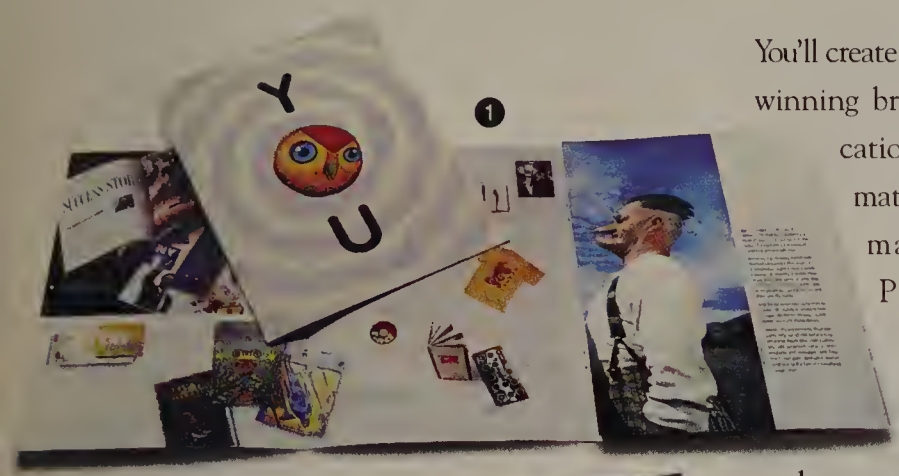

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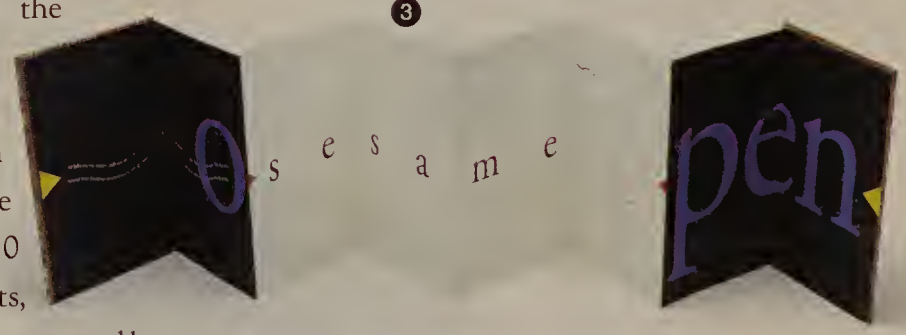

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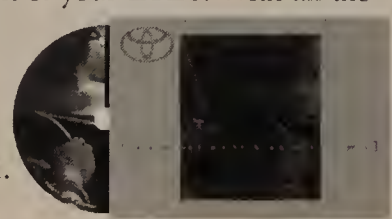

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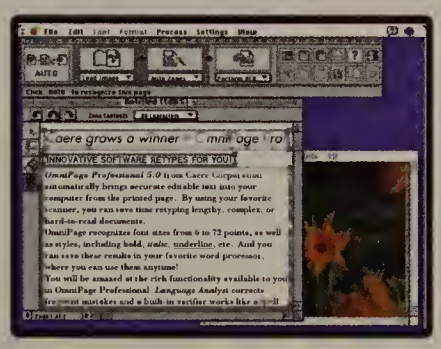

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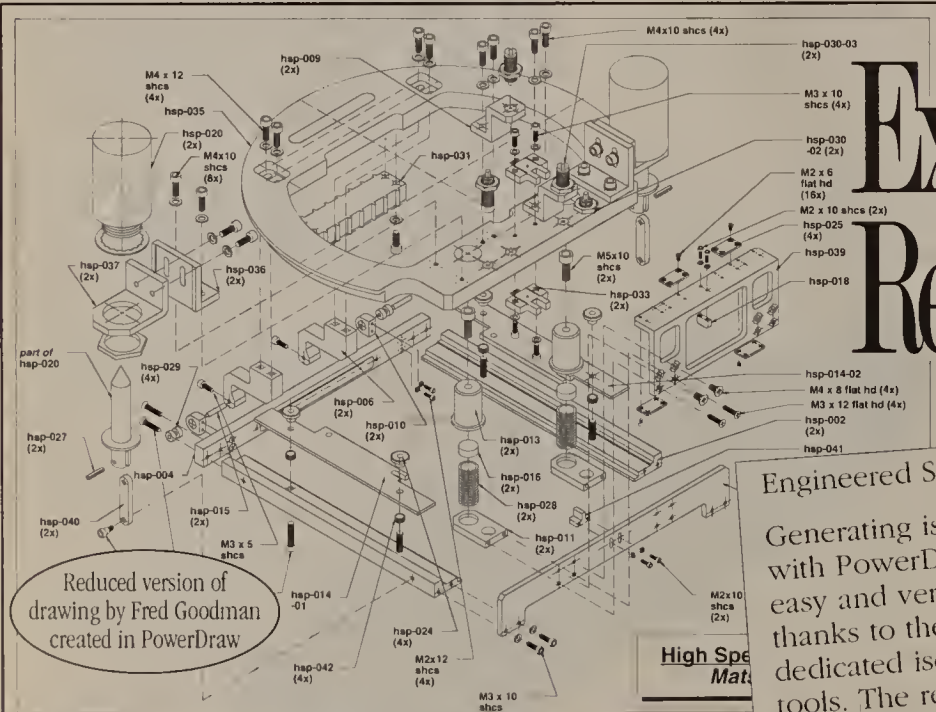

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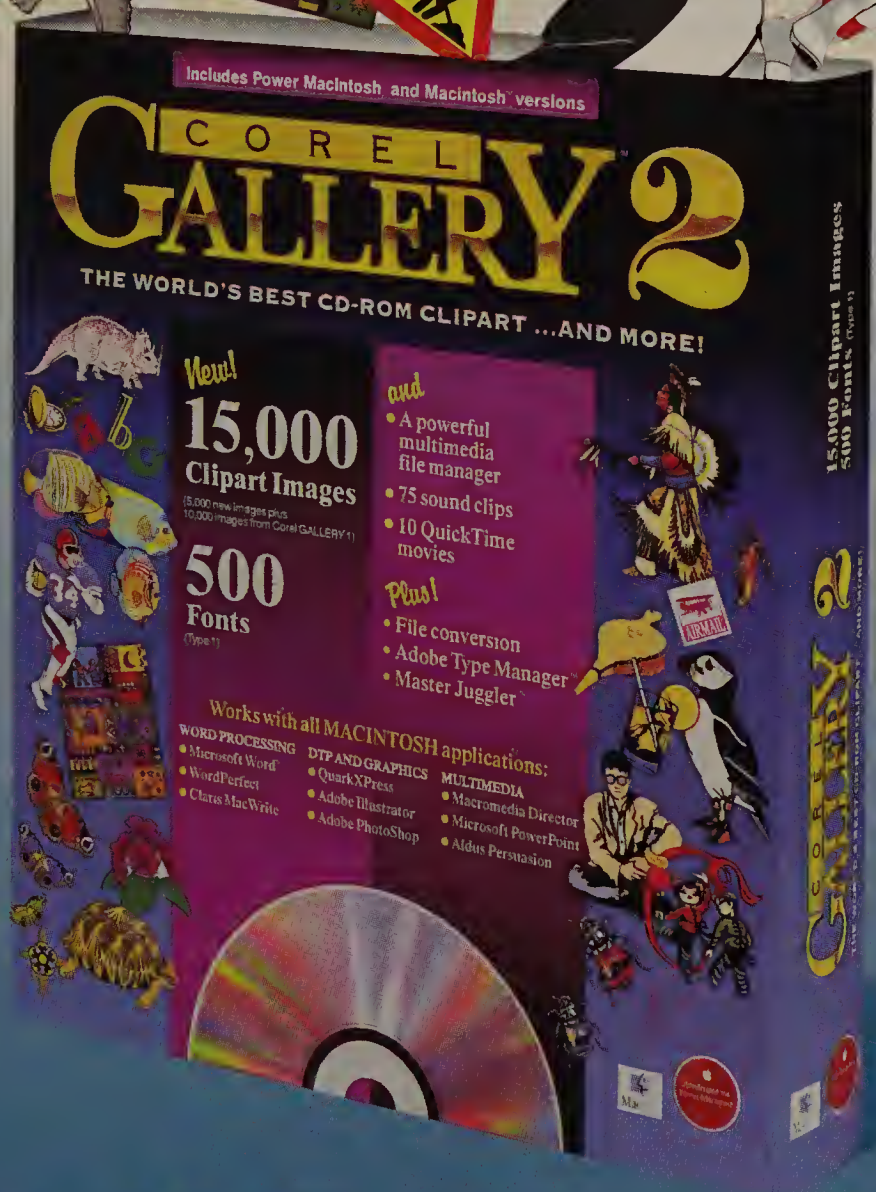

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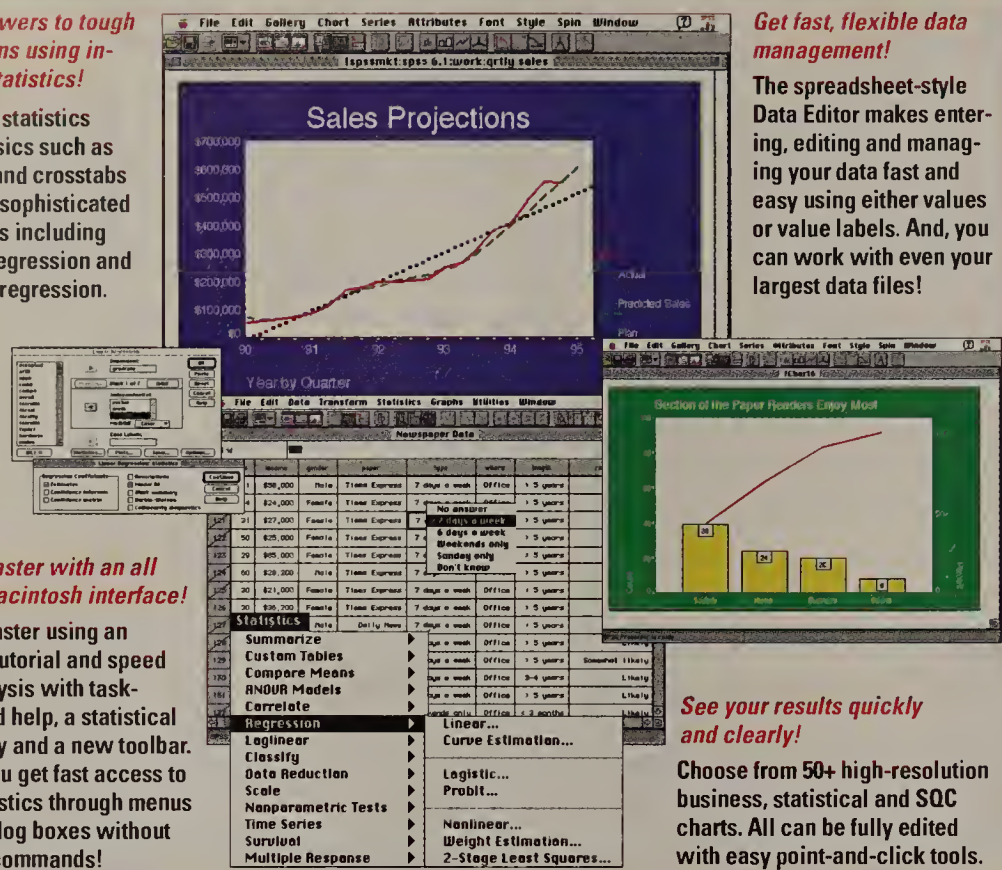

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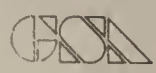

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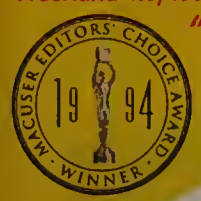

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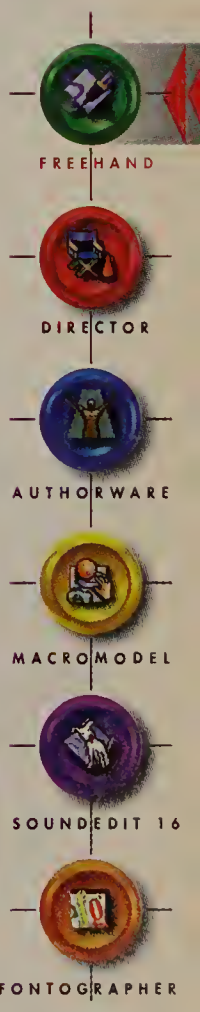

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BY ADRIAN MELLO

Clones—Full Speed Ahead

Apple's hesitancy may shut the Mac's second window of opportunity

FANS OF THE MACINTOSH sighed in relief late last fall when Apple announced its commitment to licensing the Macintosh Operating System. Developers and industry observers had hammered on Apple for years to license the OS, but Apple stubbornly refused. When Apple finally said it would share its crown jewels, those of us who have championed the Mac over the years looked at each other and smiled, but these were smiles laced with tension. It was as if we were watching a prize thoroughbred shed a leaden saddle halfway through the race—you know that on substance that horse should win, but the inferior horses are already half a lap up. Apple was finally learning its lessons, but was it too late?

After Apple delivered the one-two punch of PowerPC and licensing, the debate around the Mac's ultimate survivability changed. We no longer ask whether the Mac has the right ingredients for success, but whether its chance has passed. Well, *has* the Mac missed its window of opportunity? Some argue that since Windows machines now dominate the market, there is little to distinguish the Mac. Whether you buy that or not, Apple could have made major gains, perhaps even preempting Windows, had it only licensed the Mac OS years ago, before Windows was established. That was the Mac's first window of opportunity and one that Apple declined to take advantage of.

Personally, I don't believe the Mac has hit its high-water mark and will now fade away. Apple has artfully laid the groundwork for a second, albeit a smaller, window of opportunity. By properly exploiting this opportunity, Apple could move the Mac out of niche status and into the mainstream. Mac advocates everywhere are pinning their hopes on a resurgence of the Mac that started with PowerPC and promises to pick up steam with a successful licensing campaign. Apple's espoused objective is significant market-share growth, but attaining this goal depends on other system vendors shipping large numbers of Mac clones. And there's the rub.

Tentatively Tenacious

Apple appears to be taking an excessively cautious approach to licensing the Mac OS—an approach it can ill afford. In this issue Charles Piller evaluates Apple's progress on licensing clones and describes how potential clone makers are responding to Apple's licensing efforts (see "Is Apple Serious about Clones?"). Potential clone makers, he says, feel that despite their demonstrated interest in licensing the Mac, Apple is not supporting them enough to justify their plunging into an entirely new business. At the same time, Apple officials seem to indicate a growing reticence about licensing, both in their words and in their actions, throttling back the anticipated pace and scope of the company's licensing efforts.

At best, Apple's signals are mixed, but where clone makers are concerned, Apple has yet to prove its commitment. We have yet to see Apple license the OS to even one company big enough to make a dent in market share. And a single company—even a big one—wouldn't be enough to expand the market share quickly enough to keep software companies developing for the Mac—the single most crucial factor for the Mac's survival.

In fairness, licensing the OS is an immense undertaking with many pitfalls. It is not as simple as putting a for-sale sign in a window. Licensing requires a tremendous commitment of engineering time to create a portable OS that can run on other vendors' hardware. The proposition is even more daunting for Mac clones than it was for the early IBM clones, because from its inception the Macintosh OS and hardware were tightly integrated. Licensing also requires extensive corporate resources, to fashion agreements and provide technical assistance to clone makers. Finally, Apple management has to worry about adapting its own corporate culture—and margins—to a market that includes cost-cutting competitors selling Macs. It's all new to Apple, and the company is trying to do a good job as it learns the ropes.

Damn the Torpedoes

Recent shifts in Apple's top brass reveal the company's mixed emotions about the whole issue. The company appears to want the benefits of licensing the Mac without accepting the risks. Apple has taken a few cautious first steps toward licensing, but long-term success demands faster and bolder action. Historically, Apple has far too often insisted on elegant solutions while its competitors successfully gouge out market share with hastily introduced products. And while it's true that sometime around the end of 1996, the converged hardware reference platform (CHRP) should create a more elegant basis for future licensing efforts, Apple cannot afford to tarry. Growing the Mac market share is not just a good idea, it's critical, and it needs to happen *now*. Apple must damn the torpedoes and go full steam ahead—and for that it needs a crew of many large clone makers on board. One lesson of market-share warfare is that you must be first to

continues

DON ARDAY

battle and carry the most firepower. Apple must enter the CHRP era with as much momentum as possible.

With that in mind, here's a four-point program that Apple should adopt to beef up its licensing strategy and get serious about moving clone licensing back to the top of the agenda where it belongs.

1. License away. If Apple can find partners willing to build clones, it must hammer out agreements with them. Avoid endless negotiating and view these companies as indispensable allies. Put aside fears about being undercut on price. Opening up the clone market will increase Apple's software business. And Apple's high-quality products, leadership in design and technological innovation, and brand recognition will keep its hardware competitive. Ultimately, for a successful hardware strategy, the company must believe in its own ability to compete.

2. Secure two big clone makers. Sign up clone makers who can make a big difference relatively soon. Identify the five or six best prospects and focus on them. Right now Apple should do whatever is necessary to sign up IBM and one other player—perhaps a company from the Taipei New PC Consortium, since its members seem to be willing and could generate good numbers for Apple. This should be Apple's single highest priority over the next few months. This would not only help build market share, it would also generate a lot more developer interest in the Mac platform—interest that will be crucial as Microsoft begins to field Windows 95 at the end of summer. Increased developer interest would also boost the momentum toward Copland (System "8") and CHRP.

3. Commit resources. Apple must commit resources to licensing as quickly as possible so that big clone makers know that Apple is truly serious about immediate licensing. Hire enough qualified staff to work out the agreements and provide the technical support to clone makers who sign up. If forced to choose between supporting licensing and supporting other ancillary products and services, choose licensing. The success of the Mac platform is at the very core of Apple's business. It's more important to spend money on this and OS development in general than it is on secondary businesses such as eWorld and Newton, no matter how interesting they are.

4. Permit innovation. Give clone makers full reason to invest—do what's necessary to support clone makers who want to innovate. This again comes down to resources. Apple won't be able to support everything these companies may want to do, but it should do all that it can to encourage support for the Mac platform. At the same time Apple can help keep vendors from going too far afield by laying out clear guidelines on future OS development and by providing information on the direction the company is taking with CHRP.

Carpe Diem

There is a saying "Fool me once, shame on you. Fool me twice, shame on me." Apple may have erred by not licensing the Mac OS earlier, but it must not make the same mistake again. It cannot afford to make a halfhearted licensing effort as Windows 95 crashes the gates. Apple must take a leap of faith. There may be risks in an aggressive approach to licensing, but there are even bigger risks in not being aggressive enough. Not so long ago Apple leadership displayed tremendous courage in pulling out all the stops to make the shift to PowerPC. This is the kind of courage it must show again. m

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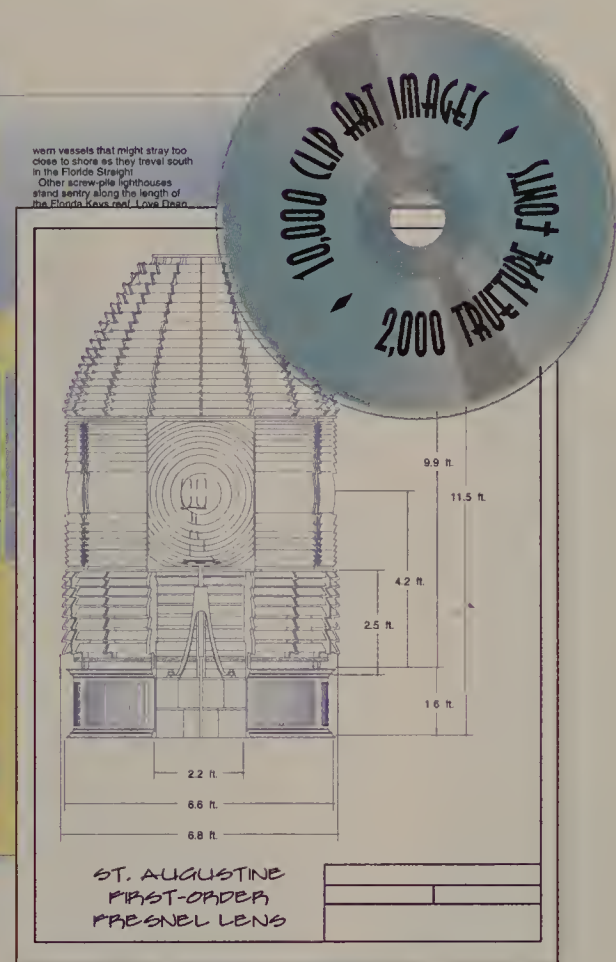

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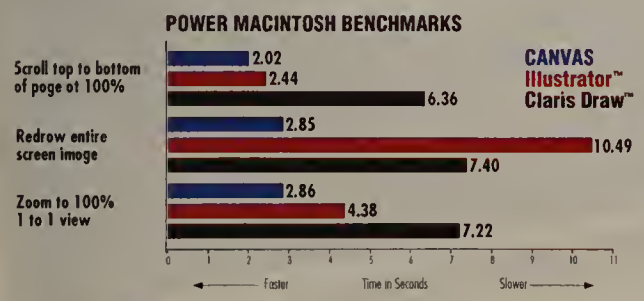

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Laura J. Kirk

Reisterstown, Maryland

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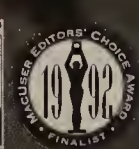

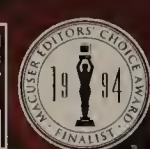

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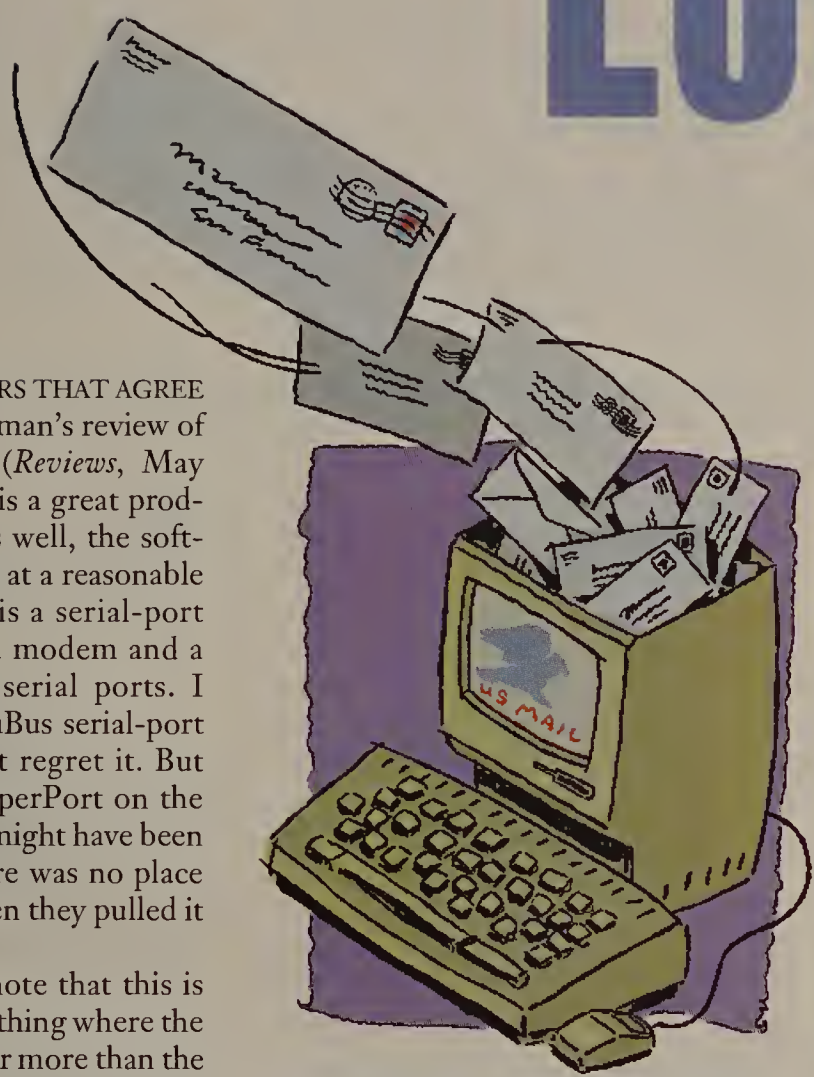

PaperPort(less)

I ALWAYS LIKE REVIEWERS THAT AGREE with me, but Mel Beckman's review of the PaperPort scanner (*Reviews*, May 1995) was incomplete. It is a great product. The hardware works well, the software is really slick, and all at a reasonable price. Unfortunately, it is a serial-port device, and if you have a modem and a printer you are out of serial ports. I sprang the $200 for a NuBus serial-port expansion card and don't regret it. But readers that bought a PaperPort on the basis of a five-star review might have been a little ticked to find there was no place to plug this little gem when they pulled it out of the box.

I also would like to note that this is the first time I bought anything where the Windows version listed for more than the Macintosh version. Maybe a new era has truly arrived.

David Werner
via America Online

Off-Center Review

I AGREE WITH MARK HURLOW IN HIS recent review of Epson's Stylus Color printer (*Reviews*, May 1995). It does produce excellent-quality output, it is slow, and a color-management scheme would be helpful. But . . .

If you use software that does not allow user control of print margins (Kid Pix, The Playroom, and so on), the output will be off center. While this does not sound fatal, it can be for software such as Print Shop Deluxe. When the Stylus's off-center output is placed over a fold area, it renders Print Shop Deluxe's greeting cards virtually useless.

Epson acknowledges the problems and says it hopes to address this issue through future driver revisions. So when the company recently released the version 1.2e driver, I was hopeful. While Epson appeared to solve the speed issue by making the driver Power Mac–native, its efforts exacerbated the alignment issue (the Read Me file warns that large graphics will be printed on two pages).

As someone "who needs excellent output on a small budget," I felt the review was directed at me, but I was disappointed when only one of my "small-budget" software packages (Microsoft Works) worked without problems.

Greg Krieser
Omaha, Nebraska

Bright's All Right

THANK YOU FOR THE EVALUATION OF "Portable Presenters" (January 1995). As a user of the Chisholm Rainbow LCD, I would like to comment on the sidebar, "Why Brighter May Not Mean Better."

First of all, it appears that for your evaluation, you chose not to adjust color settings from the way the panels were received from the factory, but any user would seek to find the best color adjustment. When you have the brightest projection capability, as the Chisholm does, the user has the choice of using full brightness in a room that cannot be darkened or full color in a room that has been darkened. The default settings must have varied from vendor to vendor, as there is no standard for projection-room light.

Second, you observe that the brighter the image, the duller the picture. This is true. If you decrease the color saturation, you will increase the brightness, and the reverse. Color saturation in a dark room helps. Color saturation in a bright room hurts. Brighter *does* mean better in many cases—ask any teacher.

Lynell Burmark
San Jose, California

Lifetime Subscription

THANK YOU, *MACWORLD!* THE INFORmation from just one sidebar ("Some Repair Shops," *PowerBook Notes*, April 1995) saved me approximately $1100—enough to pay for my *Macworld* subscription well into the next century.

My PowerBook 180's backlight went out ten months out of warranty. Apple said the only cure was a new screen, at a cost of around $1200. I crippled along for months using lamps and sometimes *flashlights* to view the screen.

When I read in your sidebar that these nonauthorized shops "do more types of repairs than an authorized service center," I checked it out. The tech at Westwind Computing spent several days hunting down a replacement for the backlight on my 180, and when he couldn't locate one, he stayed up half the night modifying one from a different model to make it work for me. He also resoldered my loose printer-port connection, saving me the price of a new board. Total bill: less than $200.

Thank you, *Macworld*, and thank you Westwind Computing. By the way, renew my subscription for the next century.

Ron Shaw
Mukilteo, Washington

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CORRECTIONS

■ *We mistakenly reported an increase in the price of Reply's 66MHz 486DX2-based DOS-on-Mac card (*News, *June 1995). The card's price remains unchanged at $599; a new product, a 486DX2-based card for the Power Mac 7100/66, is $699. Reply, 408/942-4804, 800/955-5295.*

■ *A number of errors were made in "Successful Workgroup Backup" (May 1995). Only Dantz Development's Retrospect (rather than all backup programs, as implied) uses a 1.5 multiplier to account for extra data sent over the network when backup software verifies backed-up data. A competing product, Cheyenne's Arcserve, uses a 2.0 multiplier. Unlike Arcserve, Retrospect does not redundantly back up identical files—and this leads to improvements in speed, as well as lower network traffic and media requirements on most networks. Also, contrary to a statement in the article, only Retrospect supports incremental backups to rotating sets. Finally, we incorrectly stated the cost for upgrading the single-user version of Retrospect to the ten-user version, Retrospect Remote. The actual list price is $249.*

Bottom Line Distribution (512/892-4070, 800/990-5792) was inadvertently left out of the table. Bottom Line sells three drives, all equipped with Dantz software: DAT (Sony mechanism, one-year warranty), QIC (Exabyte mechanism, two-year warranty), and 8mm (Exabyte mechanism, one-year warranty).

More on E-Zines

IN "MEGA 'ZINES" DAVID POGUE REferred to a number of E-zines that he recommended (*The Desktop Critic*, May 1995). He states, "All of the 'zines . . . are available from . . . the usual Internet sites."

Well, excuse me, but I checked all of *my* usual Internet sites, and have not been able to find DT&G. It seems to me that it makes more sense to indicate addresses where each 'zine can be found.

Tim Hommel
Windsor, Ontario, Canada

We'd hate to publish an address, then find the files no longer available at that site. If you can't find DT&G on the Net, try the Macworld forums on America Online and eWorld (keyword/shortcut **Macworld**), where we've posted samples of each 'zine.—Ed.

NOT ONLY DO YOU FOLKS PROVIDE in-depth information about the world of the Macintosh every month, but now you also reunite old friends at no additional charge!

"Mega 'Zines" featured photographs of pages from the E-zines in question. Your photograph of TidBits happens to show the byline of an article written by one Geoff Duncan, who was a great friend of mine in college four years ago. Plus, the byline gave Geoff's E-mail address, which I've been trying to find for months now (I knew he had to have one). I have written him and confirmed that he's the same Geoff I knew and befriended years ago.

Maybe you can turn this into a regular feature.

Tarl Roger Kudrick
via the Internet

Netscape News

ACCORDING TO THE MAY 1995 *Macworld Online*, Netscape 1.0N is "still free." Actually, it costs $39 plus shipping and handling.

Cynthia M. Bale
via the Internet

We're both right—Netscape 1.0N is $39 from Netscape Communications (800/638-7483), or free to educators and nonprofit groups.—Ed.

Flaming Blazing Modems

I'M BURNING UP AFTER READING "BLAZing Modems" (May 1995). The article was lacking in one huge area, which has been constantly underreported in all of the Mac literature so far. Yep, you guessed it: Apple's Express Modem/GeoPort technology. There was not the slightest mention of this type of communications option, which is something Apple has produced for over a year now. I am flaming you right now using it at 14.4 Kbps, but I would love to know how to smoke you in the future at 28.8 Kbps or even faster speeds. I would also like to fire up a telephony package using these tools, but have yet to hear much on the issue other than occasional alarms of soon-to-be-released software options. Shouldn't a Mac magazine cover Mac products? I hope you catch a significant backdraft on this article from Apple and your readers.

Keith L. Ligon
via the Internet

Apple has no 28.8-Kbps version of its Express modem and no immediate plans for one, so there was nothing to cover. As for GeoPort, no one, not even Apple, is taking advantage of it for serial communications outside of some PBX (private branch

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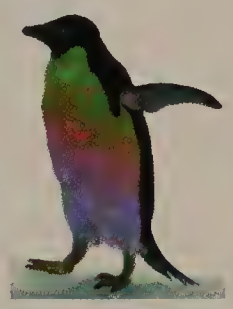

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exchange)—not modem—uses. Apple has yet to deliver the OS building blocks needed to implement the telephony features it has repeatedly promised, as we've noted elsewhere.—Ed.

Picking Nits

I AM A LONGTIME *MACWORLD* READER and subscriber (long before I started using a Macintosh). *Macworld* magazine sets itself apart because of its layout design and writing.

The word *codesigned* appeared in the May 1995 issue (*Power Mac News*). As we all understand, English is constantly evolving; words and phrases change over time. For example, *world-wide* has become *worldwide*. I may not necessarily agree, but I have come to accept the dropping of all hyphens in many hyphenated words. Some words may not be confusing without the hyphen. For instance, the word *co-operation* became *cooperation* and the word *co-worker* evolved into *coworker*. I have to say that *coworker* can be phonetically hyphenated, albeit incorrectly, into *cow-orker*. However, the hyphen should not be removed if doing so causes confusion. The word *co-design* should not be written as *codesign*. I hope that I have illustrated my point with the above examples.

Paul Huang
via the Internet

Hey, if *codesign* is good enough for *Webster's Tenth*, it's good enough for us.—Ed.

Billy-Goat Guff

THIS LETTER REVOLVES AROUND what is probably an insignificant issue for most readers of *Macworld*, which is probably why I have taken almost a year to write it. But goat breeders are a sensitive lot, and when our caprine friends are maligned, our hackles rise and we demand that the truth be known.

I am referring to "The Road to Power Macintosh" (*The Iconoclast*, May 1994). Steven Levy writes, "In their thinking, the first thing you would do upon switching from the Mac to a new RISC machine was to feed all your software to a neighborhood goat—who would munch on it happily, since it was garbage."

As for the myth that goats will eat anything, nothing could be further from the truth. In fact, they are very fussy about the condition of their food, and more finicky about the cleanliness of it than any other farm animal. Unlike their bovine, porcine, and ovine cousins, goats will not eat hay that has fallen to the dirty ground or been trampled by others in the herd. The concept that goats eat garbage comes from their innate curiosity, which prompts them to nibble at nonfood items as a means of investigation—similar to the actions of human infants who put things in their mouths to explore them. I'm sure *Macworld* readers who are also parents would not want it known that their children happily eat garbage!

I am an avid reader of *Macworld* and look forward to its arrival as much as I do the various capriculture publications I receive. In future, please refrain from bad-mouthing, even in the most trivial way, a farm animal that does not get the recognition it deserves as a productive and *clean* contributor to agriculture.

Jackie Riley
President,
Alberta Goat Breeders Association
Kingman, Alberta, Canada

FWIW . . .

OK, SO YOU HAVE A VERY USEFUL, well-written, concise magazine, to reach Macintosh users of every level. My problem is your incessant use of acronyms. As an example, I read "Newton Branches Out" (*News*, May 1995). But I couldn't finish the article, because I didn't know what *PDA panacea*, *OEM*, *PCMCIA Type II slot*, or *wireless LAN* referred to. To me, you might as well be speaking ancient Egyptian.

C'mon, guys, give us neobytes a break. What's it all mean?

Dave Pierce
via America Online

We generally explain new terms and acronyms in *Macworld*, but due to space limitations we don't define terms at every use.

A dictionary of computer terms can help you out if you find yourself lost amid the technical jargon. I flipped through several books, looking for *PDA*, *PCMCIA*, *OEM*, and *LAN* in either a glossary or index. *The Computer Glossary: The Complete Illustrated Dictionary*, seventh edition (Amacom, 1995), was the only one I found lying around that defined all four terms. Interested readers can order it at 800/262-9699.—Ed. m

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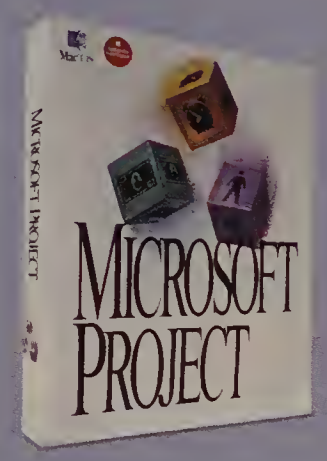

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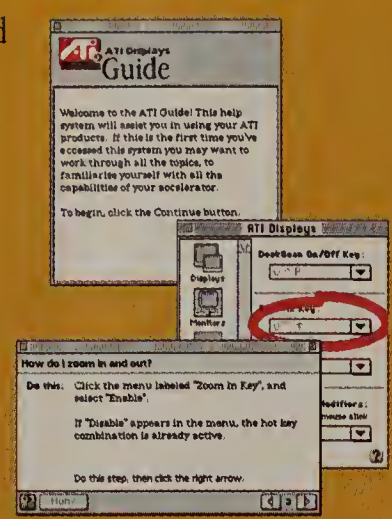

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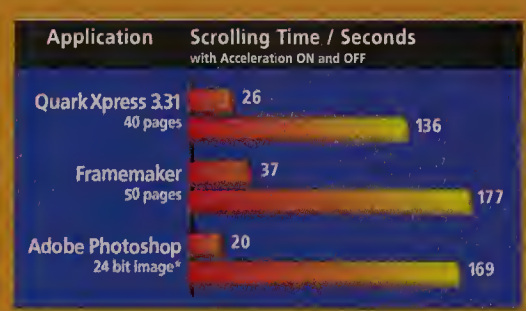

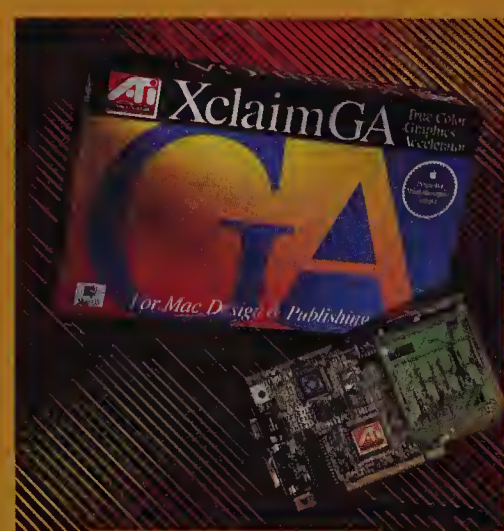

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LATE-BREAKING NEWS

MacBulletin

Two More Mac OS Licensees Apple senior vice president David Nagel recently told *Macworld* that Apple has licensed the Mac OS to "at least two other companies" that haven't yet announced products. Nagel declined to elaborate but said they were "significant names in the computer world." (For details on Mac OS licensing, see "Is Apple Serious about Clones?" in this issue.)

Radius Plans More Clones Radius (408/541-6100) will build new systems aimed at customers "whose demands may not be as specific" as those of buyers of Radius 100 publishing systems. The company has announced an exclusive distribution agreement with Ingram Micro, the giant distributor to more than 75,000 locations. The clones will provide specialized solutions for "a variety of market segments." Radius declined to comment on the systems' availability or their specs.

Microsoft-Intuit Merger Axed Over seven months after announcing their $2 billion planned merger, Microsoft and Intuit will go their separate ways rather than face a prolonged court battle with the U.S. Department of Justice. The Justice Department filed suit to halt the merger, claiming it would be anticompetitive.

MS Office 4.2.1 Installer Troubles You're not alone if you've been unable to install the Microsoft Office 4.2.1 update on your 680X0 Mac. The installer on the CD-ROM version hangs when trying to write over the Office Manager preference file—meaning users must quit from the Installer back to the Finder. Microsoft (206/882-8080) says the first 16,000 CDs had this problem. Users with an affected CD can remove the preference file before running the installer. A new CD should be shipping by the time you read this.

Apple Cuts Cost of Multimedia Firing another shot in the battle with Microsoft for domination of the multimedia market, Apple made steep cuts in the costs of its development kits and royalties for its hot QuickTime VR (for virtual reality). Royalties for software titles that use QuickTime VR now range from nothing to about 8 cents per unit, depending on volume. The previous range was from about 40 cents to 80 cents per unit, a huge difference for developers. In a related move, Apple also no longer charges developers royalties when they ship run-time versions of products made with the Apple Media Kit.

WordPerfect 3.5 to Run Faster Novell (801/225-5000) has announced that with the next version of WordPerfect, due later this year, users will be able to create HTML documents without typing text tags. WordPerfect 3.5 will also be faster, support Apple's text-to-speech technology, and ship with Netscape's Navigator web browser.

AOL Acquires More Internet America Online has expanded its Internet presence by acquiring Global Network Navigator. GNN provides 180,000 members and more pieces required for a separate AOL Internet service, scheduled to launch in August. Recently, AOL has acquired Advanced Network & Services' nationwide high-bandwidth network; WAIS, Inc. (Wide Area Information Servers), with tools for publishing information on the Internet; and BookLink and NaviSoft, which were both primarily Internet tool providers.

Saber Software Sold At press time, Saber Software, which entered the Macintosh network-management market by buying TechWorks' GraceLAN software line, was itself acquired by McAfee (408/988-3832), a PC network-management and antivirus software company, for $40.6 million. For more about network tools like GraceLAN changing hands, see *Networks* news, in this issue. m

News

EDITED BY TOM MORAN

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Expanding the PCI Mac Line

While Apple struts its new Power Mac 9500 on the main stage (see the feature article "First of a New Breed," in this issue), at least two other Power Macs are waiting in the wings. According to internal Apple documents obtained by *Macworld*, new systems code-named TNT and Nitro will share the 9500's PCI (Peripheral Component Interconnect) bus and new RAM architecture, and the Nitro will also carry a PowerPC 604 processor. Apple has declined to comment on the TNT or Nitro, although the company did confirm that it will unveil new PCI-based Power Macs later this year. Because the internal Apple documents were preliminary, the capabilities and configurations reported here could change in the shipping versions. However, the details here are more complete than those *Macworld* first reported nine months ago (see "PCI Power Mac Preview," *News*, December 1994).

DOUGLAS FRASER

Brains and Brawn The Nitro's 604 is expected to run at 100MHz, while the TNT will carry an 80MHz PowerPC 601. As in the 9500, the CPU and oscillator (clock chip) will be mounted on a processor subsystem card that can be easily removed and replaced with an upgrade. The Nitro and TNT will both have a fast RAM cache of up to 4MB.

Apple's change in memory standard will carry over to these two PCI Power Macs—the TNT and Nitro will each have 8 DIMM slots, topping out at 1GB of RAM when the slots are fully populated with 128MB DIMMs. As on the 9500, DIMMs can be added one at a time instead of in pairs, and 4MB, 8MB, 16MB, 32MB, 64MB, and 128MB DIMMS rated at 60ns are supported. The TNT will require a minimum 8MB of RAM, while the Nitro will require 16MB—base memory that must be supplied with DIMMS, as none of the PCI machines will come with RAM soldered on the motherboard.

Expansion Options The TNT and Nitro will each have three PCI expansion slots. The TNT is the smallest of the PCI Power Macs and will ship in a case similar to a 7100's, with a single internal hard drive. The Nitro will occupy a tower-style box resembling an 8100's, with bays for addition-

al internal hard drives—both the TNT and Nitro will feature dual SCSI buses, with the internal SCSI-2 Fast bus supporting data-transfer rates up to 10 MBps. Internal CD-ROM drives will be available as options for both systems. Both machines are expected to have stereo sound-in and -out jacks, two GeoPort serial ports, and a single ADB port. Like the 9500, these second-generation Power Macs will include autosensing 10BaseT (RJ-45) and AAUI Ethernet ports.

Display Systems Unlike the 9500, the TNT and Nitro will both have video circuitry on the motherboard running Mac-standard DB-15 connectors—the TNT will ship with 2MB of VRAM (expandable to 4MB), while the Nitro will come fully loaded with 4MB. In another memory shift, the TNT and Nitro's VRAM will be 32-bit DIMMs. With 2MB of VRAM, users will see 16-bit color on monitors at up to 1152-by-870-pixel resolution (the standard resolution of a 21-inch monitor); adding another 2MB (for a total of 4MB) buys users 24-bit color at that pixel resolution.

According to the internal Apple documents, the two machines add a different display twist: a Video PCI (VCI) slot that supports a subset of the PCI calls (see "Why PCI," June 1995). The tweaked bus will run at one-half the system speed (up to a maximum 50MHz) and is expected to provide even greater performance than the standard PCI bus. The slot is intended for graphics acceleration and processing cards; standard PCI cards will not work in it.

On-Board Digital Video Apple will continue bringing its AV technologies into the Mac mainstream with this generation of Power Macs; plans call for both the TNT and the Nitro to have a digital-video subsystem integrated into the motherboard. Both machines will accept composite-video and S-Video input (640 by 480 pixels at 30 frames per second, NTSC, PAL, and SECAM) through a 7-pin video-input port. The Nitro will also have a 7-pin video-out port that outputs a second, separate video stream as interlaced composite-video or S-Video suitable for an NTSC or PAL television monitor. With 4MB of VRAM, the Nitro won't blank out the main screen while it plays video, and it will support genlock, for laying computer graphics over video playback. Both the TNT and Nitro will sport a DAV slot, although it will not work with cards built for the DAV slots on previous models.

New System Software Like the 9500, the TNT and Nitro will ship with a revised version of System 7.5, code-named Marconi, that incorporates new features, hardware support, and performance enhancements. The TNT and Nitro are expected to ship this summer.

Sources also indicate that Apple has yet another PCI Power Mac, code-named Catalyst, in the offing. This machine is expected to ship in a 6100-style flat box and have a single PCI slot.

—CAMERON CROTTY

You Can Play That on a Mac?

MAC GAMES GAINING MOMENTUM

Traditionally, Apple has treated game developers like telephone solicitors: if one gets on the line, hang up quick. But these days the company is chasing Macintosh sales wherever it can find them, the home market is growing like gangbusters (over 31 percent of PCs purchased in the United States in 1994 went into the home, according to a recent Dataquest survey), and there are few surer ways to a consumer's heart than through the trigger finger. And so, Apple is pleased to see the Macintosh games market blooming.

Bungie Software (312/563-6200) led off in December 1994 with Marathon, a smooth, first-person search-and-destroy mission in the mold of Wolfenstein 3D and Doom. By the time you read this, one of the most popular PC games ever, Doom II from id Software (214/613-3589), will be available for the Macintosh. Origin (512/335-5200) has ported its epic space-opera/dogfighting game, Super Wing Commander; LucasArts' (415/721-3394) Doom-style game, Dark Forces, is expected to ship for the Mac by June. After many years of relative drought, it looks like green times ahead for Mac games.

DOUG ROSS

Doing the Numbers There are two major reasons for the expanding Macintosh game scene: market share and horsepower. In contrast with its uphill battle in the corporate market, Apple has had great success in selling Macs, particularly Performas, to home consumers. According to the recent Dataquest study, Apple captured 22.9 percent of the world sales of multimedia computers in 1994, which translates to 2.4 million such machines shipping in a single year. These are respectable numbers, especially when you consider that most PC game companies would consider a game that sells 200,000 copies a rousing success.

Apple's move to the PowerPC CPU has also broken down barriers to action games on the Macintosh. For years, the Mac's graphical

continues on page 38

In Brief

CompuServe Adds Free Internet

Upping the competition among online service providers, CompuServe (614/457-8600) is giving its subscribers three hours of free Internet access per month. Additional hours are billed at $2.50 each. CompuServe has also announced the Internet Club, which gives users 20 hours of Internet access for $15 a month in addition to the standard $9.95 basic CompuServe membership fee.

Microsoft Fixes Up Office

Microsoft has begun shipping Microsoft Office 4.3.1 for the Macintosh and Power Mac, a version that was necessary because of problems with Word 6 and Excel 5.0, two components of the software suite. Office 4.3.1 comes with Word 6.0.1, which Microsoft says launches 10 to 15 percent faster, has fewer INIT conflicts, does Word Count faster, keeps up with fast typists, and includes other fixes. The latest Office also includes Excel 5.0a, which loads and saves files faster and has had a bug fixed in its linking feature. Registered owners of Office 4.2 are being notified of the release and can get it for no charge by calling 800/315-5081.

Apple Upgrades At Ease for Workgroups

Apple has upgraded its At Ease for Workgroups access-control software by adding a new Finder interface and allowing more control by administrators. Administrators can now select one of two environments for different users: one with large buttons and folders (for kids and novices), and the usual Finder for the more experienced user. The administrator can give control over passwords and other functions to instructors in a school, for instance, and can limit access to CD-ROM and floppy disk drives. Slated to ship in mid-May, At Ease for Workgroups 3.0 will list for $295.

DOUG ROSS

IDE Drives: A Caution

THIRD-PARTY DRIVE UTILITIES ON THE WAY

If you've recently purchased a Macintosh with one of the less-expensive IDE drives Apple has begun using, such as those in the Quadra 630 and PowerBook 150, you need to know about a few possible problems. While IDE drives are a standard on PCs, their minority position on the Mac platform has led some 630 and 150 owners to worry about what they'll do when their IDE drive needs to be reformatted, or worse, when it crashes. In most cases the old standby method of hooking up an external SCSI hard drive with SCSI utilities on it will not work anymore.

Apple includes basic IDE software with the 150 and 630, but third-party developers have begun offering IDE formatting and recovery utilities that claim more features and more power than Apple's offerings.

Symantec (503/334-6054) says Norton Utilities for Macintosh has supported IDE drives since version 2.0. Symantec points out that even previous versions of Norton Utilities and subsidiary Central Point Software's MacTools can recover files lost on IDE drives through some common problems.

Vendors of hard drive–formatting utilities are adding support for IDE to their existing SCSI formatters. In Disk Manager Mac 4.0, for example, Ontrack Computer Systems (612/937-1107) includes support for multiple IDE partitions and passwords, two features Apple's software doesn't provide. Anubis's developer, CharisMac (916/885-4420), notes that Apple's IDE software doesn't take advantage of the cache present on most IDE drives. Anubis does, and CharisMac says this yields improved disk performance. FWB plans to support IDE drives in Hard Disk ToolKit by early 1996.

Since the total IDE cable length is limited to 18 inches, and since the IDE spec supports a maximum of two devices, aftermarket sales of IDE drives may be small. APS (816/483-6100) points out that the 630 includes an external SCSI port, so common external SCSI drives can be used with the machine. Even so, the company plans to offer two or three internal and external IDE drives.

Before they increase their commitment to IDE, some vendors say that they want to see Apple demonstrate its own commitment to the interface. Since only one desktop Mac uses IDE (so far), and since Apple doesn't yet support more than one IDE device per Mac, vendors wonder how many Macintosh owners will want their products.—JIM FEELEY

Gig Drives Break $500 Barrier

A MEGABYTE NOW COSTS AS MUCH AS A CANDY BAR

In 1990, $500 bought you a 60MB hard drive. Now Quantum, Seagate, and others plan to offer 3½-inch drives with over 12 times the capacity and at a lower cost—just pennies per megabyte. While the price of an entry-level drive hasn't dropped, the cost per megabyte has—from over $8 per megabyte to under 50 cents.

Quantum, for example, recently introduced the single-platter Fireball 540 SCSI-2 and two-platter Fireball 1080 SCSI-3 hard drives, which store 540MB and 1080MB, respectively. Both drives are expected to sell for well under $450 list price.

Manufacturers say improved manufacturing and quality control are partly responsible for the drop in the cost per megabyte of entry-level storage. More interesting, high-end hard drive technology is now migrating to entry-level drives.

For example, the use of PRML (partial-response, maximum-likelihood) read-channel technology in entry-level drives allows each square inch of a drive's platter to hold about 400Mbits of data compared with about 310Mbits for drives using analog peak-detect read channels.

Since each inch of data track holds more data, PRML drives can spin more slowly than non-PRML drives while achieving the same data throughput. Lower spin speeds for a drive negate the need for more-expensive motors and bearings.

ROBERT PERRY

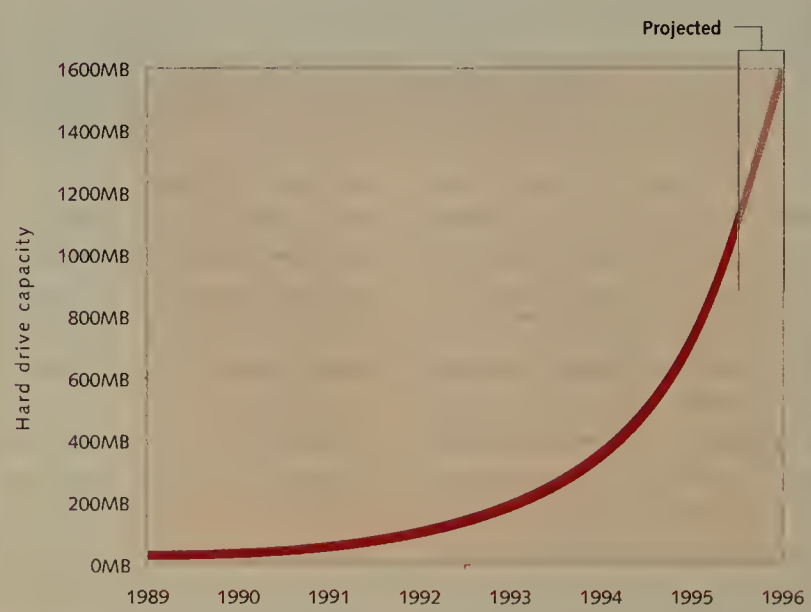
The Quantum Fireball 1080 is an example of the recent generation of low-cost 1GB hard drives.

According to drive-industry representatives, the areal densities of sub-$500 drives will continue to increase with the incorporation of impressive new technologies such as magneto-resistive (MR) read-write heads. But MR heads are currently more expensive than the widely used inductive thin-film heads.

To make sure they can use more-expensive moving parts such as MR heads and still make their price points, drive makers want to reduce the cost of stationary hard drive parts. Quantum's 420MB and 850MB Trailblazer drives, for example, use a stamped-metal base, rather than the cast-metal base used by most modern drives. Quantum says using a stamped base sharply

Hard Drive Value: What $500 Buys

In the past few years, the hard drive capacity that $500 buys has risen exponentially. Competition, new technologies, and end-user demand are all contributing to this phenomenon.



reduces costs without reducing reliability. The company said it is considering using stamped-metal bases in other models of its drives.

These technologies and economies will lead to single-platter gigabyte drives by the second half of this year, many manufacturers say. With any luck, Microsoft won't ship Word 7 before then.
—JIM FEELEY

The CD-ROM Squeeze

NEW DEVICES WILL HOLD 3.7GB TO 10GB

CD-ROMs just don't seem as big as they once did. In these days of digital video, graphics databases, and complete text libraries, 580MB doesn't go very far. At least, that's the view of companies developing a new generation of high-density CDs. These companies want to put all of the movie *Doctor Zhivago* on a single 5-inch CD.

Two upcoming 5-inch CD formats are battling to become the digital replacement for home VCRs. Both new formats aim to deliver over 135 minutes of full-screen MPEG-2 video on one side (or layer) of a 5-inch CD. And just as the consumer audio CD led to CD-ROM technology, developers plan to adapt their high-density video CDs for computer use.

For home video, a Toshiba-led consortium appears to have more support from content providers in Hollywood than does the competing Sony/Philips alliance. But for computer data uses, the race hasn't started.

Sony and Philips' HDCD format stores 3.7GB of data in a single-sided, single-layer 5-inch CD and 7.4GB in a single-sided, dual-layer CD. The HDCD drive reads the dual-layer CD by adjusting the focus point of the reading laser. Since the drive uses a 635-nanometer red laser (a shorter wavelength than in existing drives), both the distance between tracks and the sizes of the data pits can be smaller, allowing for increased data density. Sony claims that HDCD drives will offer data-transfer rates of over 1.2 MBps. Sony says HDCD drives and CDs will be available in the second half of 1996 for less than $1000. Sony's future plans include using blue diode lasers that will read CDs holding up to 11GB of data.

The Toshiba-led consortium also uses a shorter-wavelength laser to increase data density. Its SD-ROM, based on Toshiba's consumer-oriented Digital Video Disc (DVD), holds 5GB on one side of a 5-inch CD. This capacity doubles to 10GB when data is written to both sides of the CD. Toshiba claims an average random-access time of 150ms and a sustained data-transfer rate of 1.2 MBps, with SCSI-2 bursts up to 4.2 MBps. Drives aimed at the computer market should be available by the end of 1995 for about $500.

One potential drawback to Toshiba's format is that reading both sides of the CD will require either flipping over the SD-ROM or using a drive with optical pickups on each side of the CD. On the upside, Toshiba plans to offer rewritable DVDs.

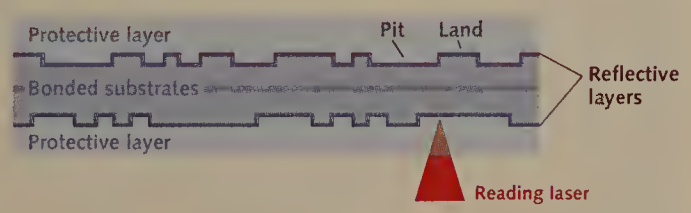
Both systems use an ISO 9660–compliant file structure that can read existing CD-ROMs. But since each system uses a slightly different method of encoding data, neither drive can read CDs created for the other system.

Apple, while impressed by the storage capacities of these devices, isn't ready to endorse either format. Apple, Microsoft, Compaq, IBM, and Hewlett-Packard together urged the Sony and Toshiba groups to develop a unified standard for the high-density CDs. The companies want to avoid a costly battle like that between VHS and Betamax VCRs. Apple, for one, feels that such a battle will delay the adoption of high-density CDs by computer manufacturers, software developers, and customers. At press time, the Toshiba and Sony groups had not announced plans to work together on a single standard.—JIM FEELEY

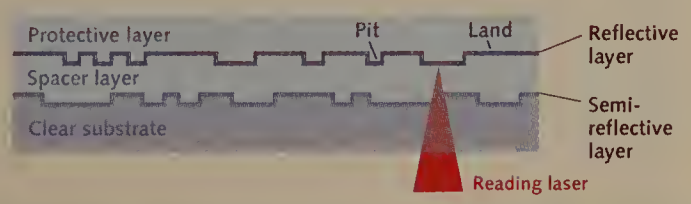
Two Double-Decker CD-ROMs

New technologies enable CD-ROMs to hold more data. Toshiba and Sony have upped their CDs' capacities by increasing data density: making the pits and lands—the structures that represent data on the disc—smaller. To double those increased capacities, both companies are putting two separate data layers on each CD, but they're doing so in different ways.

Toshiba's Super Density format holds 5GB of data on each side of its disc (Toshiba hopes to increase this capacity in the future). The disc must be flipped over to read the other side.



Sony's HDCD format holds 3.7GB on each of its two layers. Both layers are read from the same side of the disc; there is no need to flip the disc to access data. Sony says the drive seamlessly changes laser focus, from one layer to the other, when it needs to.



In Brief

PowerPrint for QuickDraw GX
GDT Softworks (604/291-9121), maker of the PowerPrint series of Mac drivers that work with a wide variety of printers, has brought out a QuickDraw GX–compatible version of the product. Called PowerPrint GX, the compilation of drivers will list for $199, or $249 on CD-ROM. The company is offering upgrades from its existing product line.

QuickTime to Add Music Software
To make it easier to manipulate and send music on a Macintosh to MIDI instruments, Apple will add Opcode Systems' Open Music System computer-aided composition software to the QuickTime multimedia architecture. Designed to help multimedia authors and professional musicians, the addition should be complete by the end of 1995.

QuickTime 2.0 for Sale on Internet
As part of its strategy to make QuickTime a cross-platform standard, Apple has begun selling its Macintosh and Windows versions of QuickTime for $9.95 over the Internet using an innovative service from First Virtual Holdings (619/234-1300). First Virtual's Internet Payment System also offers a forum for other commercial services over the Net. The customer sets up an account over the phone by voice, and never sends a credit card number over the Internet.

HyperCard 2.3
Apple (408/996-1010) has revved HyperCard to version 2.3 and for the first time will ship the authoring software in native versions for both 680X0-based Macintoshes and Power Macs. The Power Mac version runs about four times as fast as its predecessor. HyperCard 2.3 also has new color painting tools, automated button tasks, and the ability to speak text using Apple's PlainTalk text-to-speech software.

"YOU CAN PLAY" *continued*

sophistication was its own undoing when it came to games. Even today, most PC games are DOS-based, and written to a low, 320-by-200-pixel resolution available only in DOS. Ever since 13-inch monitors came out, standard Mac resolution has been 640 by 480 pixels, leaving PC developers with a dilemma: if developers bring games over at their original resolution, Mac gamers will be left squinting at a postage-stamp-size image.

Macintosh users can now enter the *Star Wars* universe in Dark Forces, a Doom-style game from LucasArts.

There are ways to increase the image size—a developer can insert a pixel-doubling routine, which writes two or more pixels to the screen for every image pixel. Or the developer can re-create all the game artwork at the higher resolution, a costly, labor-intensive process. In either case, the Mac CPU running the game must handle five times as many pixels as its PC counterpart. On 680X0 machines, this means that frame rates slow to a crawl unless a developer is willing to do some low-level tweaking.

Such tweaking efforts would have been worthwhile had Apple blessed the game market early and often, but when confronted with Apple's legendary antigames stance and lack of support for games developers, most game makers simply threw up their hands and turned to the large, profitable PC market. These days, Apple is welcoming game developers with open arms, and Power Macs are providing the zip to keep those screens full of pixels hopping along.

Welcome to the Party The improved conditions are leading more PC game companies to commit to the Mac. One such company is LucasArts. Bolstered by the success of last year's Rebel Assault, the company is bringing X-Wing to the Mac, complete with redrawn, high-resolution artwork; the combat sequences will use the improved flight engine developed for Tie Fighter. X-Wing should ship this fall on CD-ROM and include the Tour of Duty adventures previously sold separately for the PC.

Even more exciting is LucasArts' commitment to bring future releases out roughly simultaneously for Macs and PCs. Mac gamers will see how serious the company is when the Mac version of Dark Forces hits the streets only two months after its PC counterpart, which shipped in March. Full Throttle, a tongue-in-cheek adventure game starring you as the leader of a biker gang, will follow the same pattern, with the Mac version expected to ship in midsummer.

If your game tastes require more thought and less twitch, several companies plan to capitalize on all those Macs equipped with CD-ROM drives. This spring, Sony Imagesoft (310/449-2999) will ship Johnny Mnemonic, based on the movie of the same name. Virgin Interactive's (714/833-8710) horror-adventure 11th Hour (the sequel to the critically acclaimed 7th Guest) is due out in June, and Japanese game giant Capcom (408/774-0500) has announced that in October it will ship Fox Hunt, an interactive movie adventure.

Not to be outdone, Mac developers have their own plans for 1995. MacPlay (714/553-6678) will be shipping a Mac version of Descent—a space shoot-'em-up. Velocity (developer of Spectre VR; 415/776-8000) has a 3-D action game called JetSki Rage slated for later this year. Reality Bytes (the folks who wrote Sensory Overload; 617/621-1555) has another game planned for the holidays. And Bungie Software is looking at new releases with an eye toward this fall.

Some developers remain cautious. Origin, which recently shipped Super Wing Commander for the Macintosh, is one of those companies. According to media relations manager David Swofford, the company is not ready to jump full bore into the Mac market, and it will be watching the sales of Super Wing Commander closely to determine whether to port future titles. Spectrum HoloByte is another company waiting for early sales numbers on PC games before it goes ahead with Mac versions, creating at least a six-month gap between releases for the different platforms. And a company spokesperson told *Macworld* that Spectrum HoloByte had no plans to update the Mac version of Falcon, its premier flight simulator.

The buildup of Mac game titles may be slow, but it's accelerating—the market is there, the horsepower is there, and Apple is finally returning game developers' phone calls.
—CAMERON CROTTY

THE AMCOEX INDEX OF USED MACINTOSH PRICES

Machine/RAM/Hard Drive	Average Sale Price	Monthly Change
PowerBook 140/4MB/40MB	$650	+$25
PowerBook 165/4MB/80MB	$1025	$0
PowerBook 180/4MB/80MB	$1350	–$50
PowerBook Duo 230/4MB/80MB	$725	$0
Mac Classic II/4MB/40MB	$450	$0
Mac LC II/4MB/40MB	$325	–$75
Mac IIsi/3MB/40MB	$400	$0
Mac IIci/4MB/80MB	$675	+$25
Mac IIfx/4MB/80MB	$650	–$50
Centris 650/8MB/230MB	$1200	–$75
Quadra 900/8MB/160MB	$1775	–$75
Power Mac 7100/66/8MB/350MB	$2200	$0

Index provided by the American Computer Exchange of Atlanta (800/786-0717). It reflects sales during week of May 20. Configurations include keyboard and exclude monitor and display board for noncompact models.

BUGS & TURKEYS

Power Macintosh users may encounter "out of memory" errors using version 5.0 of Intermission, a screen-saver engine from Delrina (416/441-3676). The company is working on the problem and expects to fix it in a future release, which will be mailed free to users who request it.

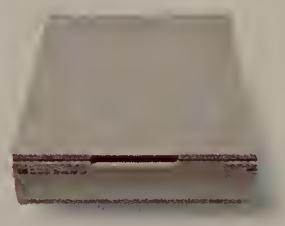
The Epson Stylus Color prints at 720 by 720 dpi—sort of. Epson admits that the printer rasterizes images at 360 dpi, but halftones them at 720 dpi. Photos printed at 720 dpi look fine—but line art looks as if it's been printed at 360 dpi. Epson says it is considering making changes to the next version of the driver.

Macworld will send you a Bug Report T-shirt if you are the first to inform us of a serious, reproducible bug that we report in this column, or a Turkey Shoot T-Shirt if we shoot your turkey in this space. See *How to Contact Macworld.*

Tiny had the hard part. Scanning it was easy.

Introducing HP ScanJet Scanners

They're simple to set up. Even simpler to operate. And with software that makes scanning more automatic, using HP ScanJet scanners has never been easier. The new HP ScanJet 3c now offers internal 30-bit color at 2400-dpi enhanced resolution (600-dpi optical), and also includes free Corel PHOTO-PAINT for PCs.* The HP ScanJet 3p delivers 1200-dpi enhanced resolution (300-dpi optical). Both come with OCR software. For more information, call 1-800-SCANJET, Ext. 9232.†



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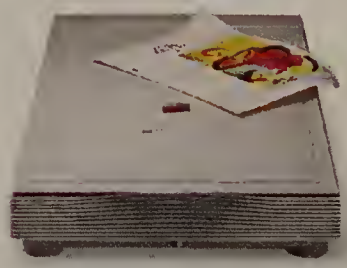

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There's the one

where you're suddenly standing onstage

at the senior prom wearing only really

big underwear and a fez.

And everyone is laughing hysterically,

including Mr. Dimnitz

your guidance counselor.

Then there's

the one

where your computer's

hard drive fries 30 minutes before the big

presentation, and you've

lost everything.

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Power Mac News

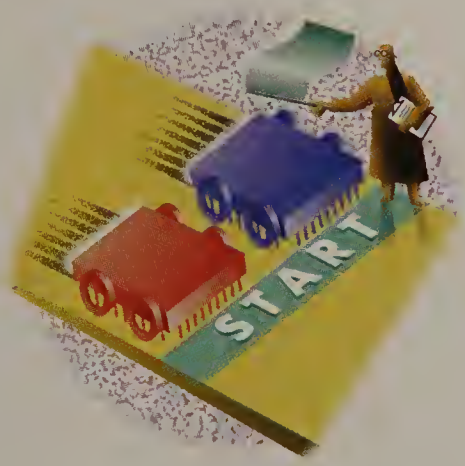
New 9500 versus PCs

THE 9500 HAS ROUGH PARITY WITH TOP PCS

To blow the Pentium out of the water—that was the promise of the PowerPC 604 CPU jointly developed by IBM, Motorola, and Apple. Intel's Pentium microprocessor would pale by comparison. But Macworld Lab tests show that the newest Power Macintosh, the 9500, which uses a 132MHz PowerPC 604, while extremely fast, does not always surpass the newest PCs using the new 120MHz Pentium. (For more details on Apple's new Power Mac 9500 system see "First of a New Breed," in this issue.)

The 604-based 9500 clearly performs better for raw CPU and FPU work, but PCs still have the edge in disk access. And Macworld Lab's benchmark results show that the way that applications are designed can either overcome a platform's weaknesses or ignore its strengths. For example, Adobe Photoshop 3.0 for Macintosh has been optimized so its disk I/O is faster on a Mac than on a PC, even though the PC's I/O throughput is generally greater than a Mac's. And Microsoft's Excel and Word run significantly faster on a PC than on a Macintosh, even when doing CPU-intensive calculations.

The relative performance of a Windows PC versus a Macintosh depends as much on what software you run as it does on anything else—a faster CPU does not always mean a faster computer. This trend should continue this summer, when several vendors are expected to ship the first 100MHz PowerPC 604-based PCs. (The systems will run a beta version of Windows NT 3.5.1.) Most Windows programs run under emulation in NT, so the systems will likely be slower than their Macintosh (and Pentium) counterparts. Their Mac counterpart is the 120MHz 604-based Power Mac 9500/120. But the few beta native-NT application programs (Excel and Word), run extremely fast on the PowerPC NT personal computer.

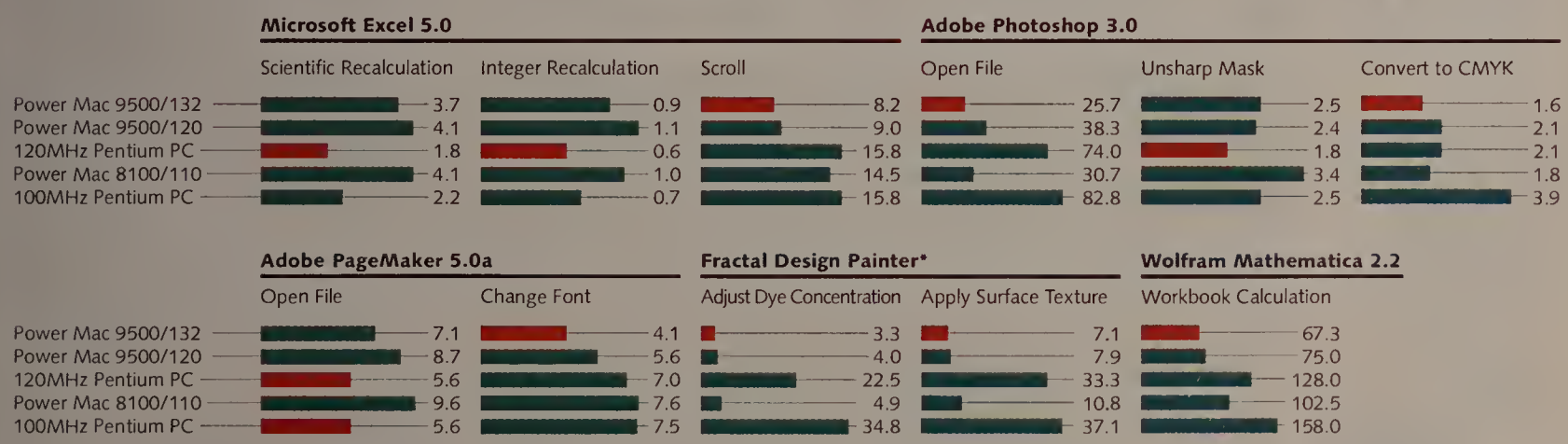


While Apple continues to push the performance envelope, it has by no means left the competition behind. It may take the next generation of the Mac Operating System, code-named Copland, to remove some of the performance barriers in the Mac's design, as well as continued use of faster RAM and system buses, to let Apple take full advantage of the PowerPC's impressive capabilities. (For more on related performance issues, see "Power Mac versus Pentium PC," *Power Mac News*, *Macworld*, February 1995.)—GALEN GRUMAN AND MACWORLD LAB

MW LAB The 9500 versus the Latest PCs

Although the Power Mac 9500 is a much faster Mac, improvements in the designs of Pentium PCs have kept the performance race tight. The 9500 is often faster in CPU-dependent operations and in graphics-intensive tasks, but Pentium PCs hold the edge in disk I/O. For scientific calculation tasks, the Mac tests out faster (curiously, not in Excel, but that's probably due to Microsoft's poor design of the Mac version compared with the Windows version; similarly, Fractal Design Painter for Windows' poor memory management makes it much slower for manipulating large images than the Mac version).

Products are listed in decreasing order of overall performance. **= Best result in test. Shorter bars are better. Results are in seconds.**

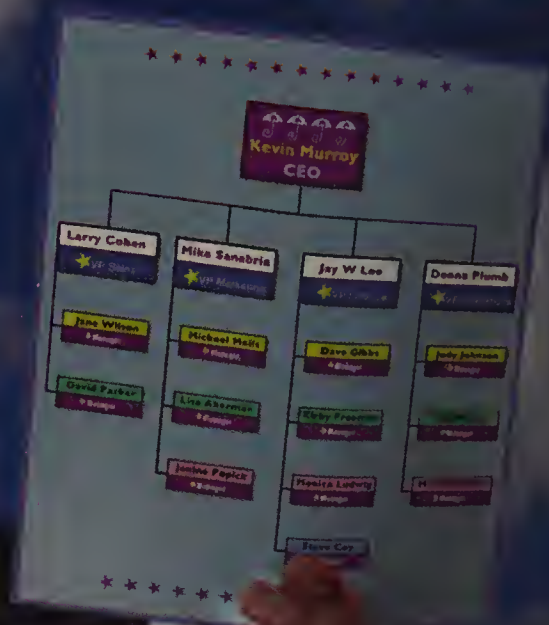


For compatibility reasons, we tested version 2.5 for the Power Macs and version 3.0 for Windows. Macworld Lab tests show the two versions have nearly identical performance.

BEHIND OUR TESTS We tested the Windows and Mac versions of the same programs performing representative high-end tasks on a PC equipped with 16MB of RAM, a 256K cache card, and an accelerated video card driving a 17-inch monitor at 8-bit color, using Windows for Workgroups 3.11 and MS-DOS 6.22. The Power Macs were tested as described in the feature "First of a New Breed," in this issue. The 120MHz Pentium PC is a Gateway 2000, the 100MHz Pentium PC is from Micron Technology.—**Macworld Lab testing supervised by Mark Hurlow and Danny Lee**

JOHN BLECK

I CAN DRAW! I CAN CHART!



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Macworld Online

by Macworld Online Staff

Today's media bristles with stories of online espionage, break-ins, and sabotage; and individuals who blithely offer their Social Security or credit card numbers over the telephone are generally loath to send the same information via the modem. In truth, the telephone is far from being an inviolate communications vehicle, and wireless phones are an audio voyeur's delight. Online communications, meanwhile, are gradually becoming more secure.

Tales from the Encrypt

Commercial online services provide more safeguards than does the Internet, but with E-mail there is always the chance that your message might be intercepted, forwarded, or accidentally sent to the wrong address. Many online folk resort to desktop encryption schemes—such as Phil Zimmerman's robust freeware program PGP (Pretty Good Privacy)—that provide at least some degree of security. Keep in mind, however, that for PGP, as for many other encryption schemes, foreign distribution is controlled by U.S. export laws. (The RSA Data Security algorithms used by the PGP program are classified as "munitions.")

PGP uses public-key cryptography, which requires two "keys." The private key is similar to your bank card's secret PIN; your public key may be distributed as widely as you like. When you encrypt something with your private key, only your public key can decrypt it. Similarly, if someone encrypts something using your public key, only your private key can decode it. This scheme ensures both privacy and authentication. PGP's interface is somewhat clumsy but remarkably secure. For more information on PGP and other privacy tools, go to **http://www.acm.usl.edu/~dca6381/c2_mirror/crypto.html**.

Several solutions have appeared on the electronic-commerce front that promise secure access and transactions. Particularly encouraging for online entrepreneurs is Terisa Systems' recent announcement that the SSL (Secure Socket Layer) strategy employed by Netscape's ubiquitous Web browser will be interoperable with the more open sHTTP (Secure Hypertext Transfer Protocol) standard. Other encryption schemes, such as DigiCash and CyberCash, promise easy, secure online transfer of even small amounts of money in the not-distant future.

Creating Passwords

Passwords are the latchkeys that grant online internauts entrée to vast electronic communities and digital data banks. All commercial online services and many Internet sites require at least one password for access. The reasons are simple—security and more accurate head counts. Here are a few tips for creating better passwords.

- Never use your own or your child's name or nickname. Spelling a name backward or scrambling the letters won't help, either. Hackers can write algorithms that check for these permutations faster than you can type the rickety password.
- Never use a correctly spelled word; checking against an unabridged dictionary is a common ploy of hackers. Adding a number or two to the mix makes the password more difficult to crack, but never use personal alphanumeric combinations such as your license-plate number.
- Choose a password that is at least 6 characters long and includes number, option-*key*, mixed-case, and punctuation characters whenever the service allows. Use mnemonic devices such as the first letters in words from a favorite song or poem (for instance, "I was born in a crossfire hurricane" becomes IWBIACH). To make a password more memorable, use a nonsense word, like nUmB#s or tE@4Tw0, that is pronounceable.
- Don't share your password with anyone, and don't store it where a digital interloper might find it. If you have multiple passwords, fight the temptation to keep a list. If you have a password list, consider encrypting it. m

LIVE-EVENTS CALENDAR

Plug into Macworld Online for our weekly real-time events that feature some of the brightest stars in the Macintosh universe. In addition to our troubleshooting clinics, we bring editors and writers, artists and visionaries directly to your desktop. It's a great place to spend an hour learning about your Mac. Please come armed with questions, comments, and critiques. America Online events are on Thursdays and eWorld events are on Wednesdays. All events are at 6 p.m. Pacific standard time.

Ask Cary Lu
July 5, eWorld
Contributing editor and monthly *PowerBook Notes* columnist Cary Lu brings his considerable knowledge to bear on all your Macintosh-related questions.

Tag-Team Troubleshooting
July 6, AOL
Macworld Online's Steve Costa and Matthew Hawn take turns tuning, tweaking, and torquing your troubled Macintosh with their top tips and tricks.

Macworld Lab Report
July 13, AOL
Join the Macworld Lab for an evening of tech talk and a peek into the inner workings of *Macworld*'s testing labs. Tune in as lab director Lauren Black and her staff talk about benchmarks, performance tests, and maybe a dash of *Star Trek*.

Costa's Clinic
July 19, eWorld
Join Macworld Online's own Steve Costa for a walk-in Mac clinic. Steve will help you tune up your computer and choose great shareware, and he gives you the lowdown, the high sign, and the straight dope on all things Macintosh.

The New Edge
July 20, AOL
By day, David Steuer develops CD-ROMs and online projects for major New York publishers. But the rest of the time, he's pushing for a new approach to the digital world that puts people first, technology second. Come learn about the Cyborganic group, David's latest passion.

Jim Heid Q&A
July 27, AOL
Contributing editor Jim Heid's *Complete Mac Handbook* is a fantastic compendium of Mac lore no Mac owner should be without. At this event, Jim is ready to answer just about any Mac question you can throw at him.

REACHING MACWORLD ONLINE

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Painter 3.1

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Circle 190 on reader service card

New Products

THE LATEST MACINTOSH RELEASES

by Jim Feeley
and Joanna Pearlstein

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY *MACWORLD*. UNLESS OTHERWISE STATED, ALL PRICES ARE SUGGESTED RETAIL AND THE MINIMUM REQUIREMENTS FOR OPERATION ARE A MAC PLUS WITH 1MB OF RAM, RUNNING SYSTEM 6. A ◀ SIGNIFIES THAT A NATIVE POWER MAC VERSION OF THE PRODUCT IS AVAILABLE. ALL INFORMATION AND PERFORMANCE CLAIMS ARE SUPPLIED BY THE PRODUCT VENDOR AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY *MACWORLD*. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

33MHz FPU for 520 and 540

For those engineering and 3-D–graphics types who need an FPU in their 520- or 540-model PowerBooks, Sonnet offers a full 33MHz 68040 processor board that replaces the FPU-less 68LC040 that Apple ships with its notebook computers. The upgrade also provides a 30 percent speed boost over the stock 25MHz processor in those PowerBooks. The price includes installation and requires you to exchange the original processor board. $449. Sonnet Technologies, 714/261-2800, 800/786-6260; fax 714/261-2461.

2834FX

Still waiting for that Web page to draw? Maybe it's time you dumped your 14.4-Kbps modem. The 2834FX V.34 modem, built around a Rockwell chip set, transfers data at 28.8 Kbps and faxes at 14.4 Kbps. $339. Best Data Products, 818/773-9600; fax 818/773-9619.

Blue Line

If you're just about blue in the face from coordinating all your storage needs, you may be ready for the Blue Line, Microtech's system of stackable hard drives, RAID systems, tape drives, and removable hard drives. All Blue Line products connect with Microtech's 4-inch-long SCSI jumpers, and all except the tape drives feature an LCD readout that displays power, SCSI, and sequencing information—plus Microtech's tech-

Blue Line

nical-support phone numbers. Microtech, 203/468-6223, 800/626-4276; fax 203/468-9447.

DataDock

MicroNet's DataDock lets you remove and install storage devices without turning off your computer. Aimed at graphics and multimedia professionals who need to transport huge data files, the DataDock works with hard drive, SyQuest, magneto-optical, and DAT drive modules built by MicroNet. Hard drives can be configured as RAID Level 0 or Level 1 arrays. Rack-mount and tower configurations are also available. Two-slot Fast/Wide docking station with a PDS or a NuBus SCSI card $1695; Fast SCSI-2 version $899. MicroNet Technology, 714/453-6000; fax 714/453-6001.

Deltis CD-R

A double-speed CD-recorder and player with 1MB of cache memory, the Deltis CD-R supports multisession recording and all standard CD formats, including Photo CD. Bundled with CD-R mastering software, the drive costs $1995; without software it costs $1795. Olympus Image Systems, 516/844-5000, 800/347-4027; fax 516/844-5339.

Deltis CD-R

HyperTape

The HyperTape SCSI tape drive stores 2GB of uncompressed data and up to 4GB of compressed data on a single QIC-Wide minicartridge. The low-cost drive offers transfer rates of up to 30MB per minute. It ships with Retrospect 2.1 backup software. $499.95, 400-foot Sony tape $31.95. APS Technologies, 816/483-6100, 800/235-2753; fax 816/483-3077.

Mediashow Traveler

An LCD projector that takes aim at expensive three-gun projectors, the Mediashow Traveler lets you use its remote control to switch between a Mac and two other video sources. It features an 8.4-inch-diagonal active matrix LCD panel; 24-bit, 640-by-480-pixel resolution; built-in keystone correction; and a user-replaceable 575-watt metal halide bulb. With its stereo audio amplifier, the Traveler weighs 30 pounds. $9695. Sayett Technology, 716/264-9250, 800/678-7469; fax 716/264-9265.

Mediashow Traveler

MI PB 14.4 PCMCIA Fax/Modem

This PC Card fax modem sends and receives data and faxes at up to 14.4 Kbps. The card includes MNP Class 5 data compression and CCITT V.42bis error correction. It supports PCMCIA release 2.1 and JEIDA 4.1, weighs just 1.5 ounces, and is less than 0.25 inch thick. $199. Memory, 714/453-8008, 800/266-0488; fax 714/453-8103.

PlateMaker 8200

The PlateMaker 8200 creates printing plates that withstand press runs in excess of 15,000 impressions. The PostScript Level 2 device also functions as a 600-by-600-dpi printer, that you can upgrade to 800-by-800-dpi or even 1200-by-1200 dpi, by adding more RAM. Xanté's Halftone Calibration Technology allows adjustment of halftone gamma curves. The company's Enhanced Screening provides 40 percent more levels of gray than normal screening does at standard line-screen frequencies. For example, the 8200 supports 256 gray levels with 106 lines per inch. The standard configuration includes an AMD 29030/33MHz RISC processor, 16MB of RAM, LocalTalk, and a SCSI port. An Ethernet option is available. $5495. Xanté, 205/476-8189, 800/926-8839, fax 205/476-9421.

PlateMaker 8200

PrecisionView 17

Geared toward graphics and digital-video professionals, the PrecisionView 17 is a Trinitron monitor with the equivalent of 0.25mm dot pitch and dual-access dynamic focus. Controls for changing image size, shape, and color temperature are located on the front panel for easy access. This Energy Star–compliant monitor supports resolutions of up to 1024 by 768 pixels at a refresh rate of 75Hz. $1099. Radius, 408/541-6100, 800/227-2795; fax 408/541-6150.

Pro Imager 7000

Here's a large-format scanner for people who need size and speed but can live without 36-bit color. The Pro Imager 7000 quickly scans line art, gray-scale, and color images. The 2400-dpi, 24-bit flatbed color scanner reads images as big as 11.7 by 17 inches. The scanner includes Series II QuickScan and ColorAccess imaging software. $9995. PixelCraft, 510/562-2480, 800/933-0330; fax 510/562-6451.

SCSI Switch

The rack-mountable SCSI Switch lets two computer systems share up to 32 SCSI devices. Controllable through both its front panel and supplied Macintosh software, this 4-by-2-inch electronic cross-point switch extends the single-ended SCSI cable limit to 40 feet. The SCSI Switch is available in six models with the option of differential SCSI support, plus a choice of 50-pin Centronics, 50-pin high-density SCSI-2, or 68-pin SCSI-2 Wide and SCSI-3 connectors. The 50-pin single-ended SCSI-2 model, the ACI-2012CSN-1, lists for $1545; other models are available. Applied Concepts, 503/685-9300; fax 503/685-9099.

Tuba II and French Horn II

Don't try taking these out for marching-band practice; their power cords aren't long enough. That's OK, though—these

continues

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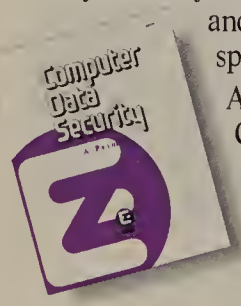

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Circle 36 on reader service card

two monitors are aimed at the business graphics and home-office market. Both monitors meet Energy Star and MPR II guidelines and let you adjust tilt, trapezoidal and pincushioning imperfections, and color balance. The Tuba II adds degaussing and RGB tuning. The 15-inch French Horn II has a maximum resolution of 1280 by 1024 pixels at 60Hz; the 17-inch Tuba II supports 1600 by 1280 pixels at 76Hz. French Horn II $499 company's estimated price; Tuba II $699 company's estimated price. Orchestra MultiSystems, 714/891-3861, 800/237-9988; fax 714/891-2661.

Tuba II

Whirlwind RAID

A new line of SCSI Fast/Wide RAID systems aimed at video and graphics professionals, as well as network servers, Whirlwind RAID systems deliver sustained data-transfer rates of 9 MBps in HDT BenchTest and about 5.7 MBps with VideoVision Studio. The 2GB and 4GB arrays are built around Seagate Barracuda mechanisms, while the 8GB configuration uses Quantum Atlas mechanisms. Trillium Remus software and the Atto SE IV SCSI card round out the packages. Spin also offers 2GB and 4GB internal RAID systems for 800 and 8100 series Macs. 2GB array $2999, 4GB $3999, 8GB $5499. Spin Peripherals, 508/787-1200, 800/215-2900; fax 508/787-1201 .

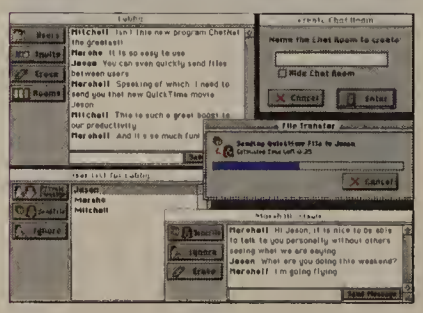
SOFTWARE

4-Sight AutoPS

This utility helps graphics and prepress professionals print PostScript files remotely. First, users create a PostScript file and transfer it to its destination with 4-Sight's ISDN Manager or another method. AutoPS downloads the file and prints it to a selected printer or imagesetter. Finally, depending on the user's preference, the software automatically either deletes or saves the document. $295. 4-Sight, 515/221-3000; fax 800/448-3299.

ChatNet

It's not always easy to find a place to have a private conversation in the office. You can nip into the hallway for a quick chat, or talk over the office network.



ChatNet

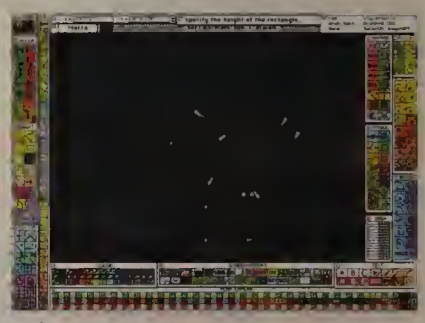
ChatNet provides serverless conferencing for Macintosh networks, enabling users to interact via public or private conferences, send instant messages, and transfer files. Requires Mac SE, System 6.0.5, EtherTalk or LocalTalk network. $99 for 10 users; $249 for 50 users; $499 for 250 users. Electronic Learning Systems, 904/375-0558, 800/443-7971; fax 904/375-5679.

EasyTyper

Like a psychic friend, your Mac knows what you're thinking—at least when you have EasyTyper installed. This glossary utility learns specific words and phrases; when you type the first few characters and press a user-defined hot key, EasyTyper completes the text for you, in whatever application you're using—without your needing to set up lists of words or abbreviations. Requires System 7. $59.95. LandWare, 201/347- 0031, 800/526-3977; fax 201/347- 0340.

GfxCAD 2.0

This architectural CAD package includes two products, FlexiCAD and FlexShell. FlexiCAD is a drafting engine that lets you draw shapes, merge drawings, and perform floating-point CAD operations. The product supplies plotter drivers and supports B-splines, Bézier curves, layers,



GfxCAD 2.0

and unlimited undos and zoom levels. FlexShell is for producing architectural construction documents; it includes the standard plan-layer naming convention developed by the American Institute of Architects. Requires 68030-based Mac with FPU, 8MB of RAM, 17-inch color monitor. $495. Grafx Computing, 716/782-2468; fax 716/782-2629.

MacEKG 3

If our computers had medical insurance, their health-care providers might recommend MacEKG as a form of preventive medicine. Version 3 of this diagnostic utility adds tests for IDE drives and for two more chips on the motherboard. In addition to monitoring system performance, MacEKG now includes PowerScope, a utility that probes the effect of system extensions on performance. Requires 2MB of RAM, System 7. $150. MicroMat Computer Systems, 707/837-8012, 800/829-6227; fax 707/837-0209.

MailShark, NetShark, and WebShark

InterCon's three new Internet access products aim to have you terrorizing Internet waters in no time. NetShark provides users with access to E-mail, newsgroups, Telnet, Gopher, FTP, and the WebShark World Wide Web browser; users can perform multiple functions

continues

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simultaneously. The MailShark electronic-mail system lets users read and write messages containing graphics files, sounds, and rich text, including text formatting. Filtering options let users automatically respond to and file messages. InterCon claims WebShark is 40 percent faster than any other Web browser on the market. All three require Mac SE, 5MB of RAM, System 7. MailShark $59.95; NetShark $99.95; WebShark $19.95. InterCon Systems, 703/709-5500, 800/468-1424; fax 703/ 709-5555.

MC-P\CoCo 2.2

MC-P\CoCo 2.2

Hannah Stewart's MC-P\CoCo displays three windows for facilitating your Photoshop work. The preview window shows images using CoCo's own color-correction algorithms. Inside the color-correction window, you can view 16 separate adjustments in a preview mode, working in either RGB or CMYK color space. Finally, the inks palette window lets users create and display color sets and enter color values for paper or substrate. Requires Photoshop 2.5.1 or later. $895. Hannah Stewart, 214/651-0640, 800/588-0039; fax 214/651-0644.

PM Design Set

Get more control over Adobe PageMaker with PM Design Set. This set of seven additions to PageMaker lets you turn off printing for individual objects, create fractions, simplify printing to film, merge several publications in a book list into a single file, save documents automatically, fine-tune magnification, and create ligatures. Requires 68020-based Mac, 4MB of RAM, Adobe PageMaker 5.0; PostScript printer recommended. $79.95. Bullfrog Software Engineering, 206/646-8100, 800/646-8167; fax 206/637-8169.

RSA Secure

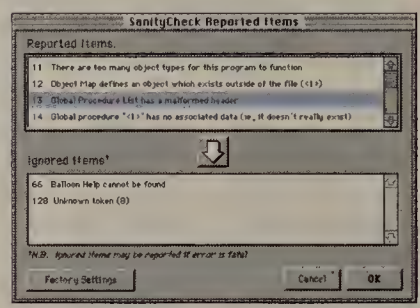
If the news stories about stolen company secrets have you worried, here's a solution. With RSA Secure you can protect just a few sensitive files or an entire hard disk. The application encrypts data using RSA's proprietary RC4 Symmetric Stream Cipher, which the company says is more secure than the government's DES standard. To ensure that companies can access encrypted data in emergency situations, the product's Threshold-Based Emergency Access feature lets administrators designate emergency decryption authority to a set of trustees, and establish a minimum number of trustees who must agree before they can implement emergency procedures. Requires System 7. $99. RSA Data Security, 415/595-8782, 800/782-5453; fax 415/595-1873.

Rock & Roll Art Screen Saver

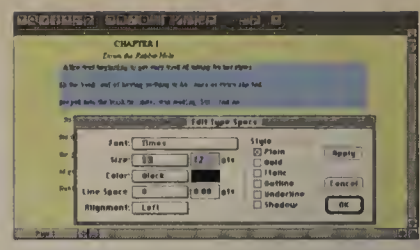
Which ranks higher on the scale of screen-saver coolness, flying toasters or psychedelic rock posters from the sixties? We're not sure. Julianne Multimedia's Rock & Roll Art Screen Saver displays psychedelic posters from concerts at the Avalon Ballroom and the Fillmore Auditorium in San Francisco. Images include Stanley Mouse's *Girl with the Green Hair*, Rick Griffin's *Eternal Reservoir*, and Victor Moscoso's *Break on Through* posters. Requires System 7, 2MB of RAM, 8-bit color. $29.95. Julianne Multimedia, 415/892-0599, 800/585-4266; fax 415/897-3373.

SanityCheck

Troubleshoot that glitch-ridden 4th Dimension database with Foresight's SanityCheck, a 4D developer's tool that verifies resources, checks for conflicts, and compares file structures. The product can be used as a diagnostic aid during debugging sessions or during the code-compile-run cycle. Also included is DataForkCopy, which helps developers resolve resource-fork problems. Requires System 7, 4th Dimension 2.2.3 or later. $195. Foresight Technology, 817/731-4444, 800/701-9393; fax 817/731-9304.



SanityCheck



Scorpio

Scorpio

Abbott Systems likes to say that with Scorpio, you can buy a word processor for less than the tax on Microsoft Word. This word processor features character formatting, color, a spelling checker, word count, simple tabs, and the ability to jump to any page in a document quickly. Users can designate text, such as your signature, to be inserted automatically when printing each document. Support for Claris XTND filters lets Scorpio read and write formats for other word processors. Requires Mac II, 8-bit color. $29. Abbott Systems, 800/552-9157; fax 914/747-9115.

CD-ROMS

Home Repair Encyclopedia

If you're up there on the roof and suddenly can't remember how to replace a shingle, simply fire up your PowerBook and battery-powered CD-ROM drive, launch the Home Repair Encyclopedia, and look it up. This CD-ROM uses QuickTime movies, photos, illustrations, and sound to show you how to complete

continues

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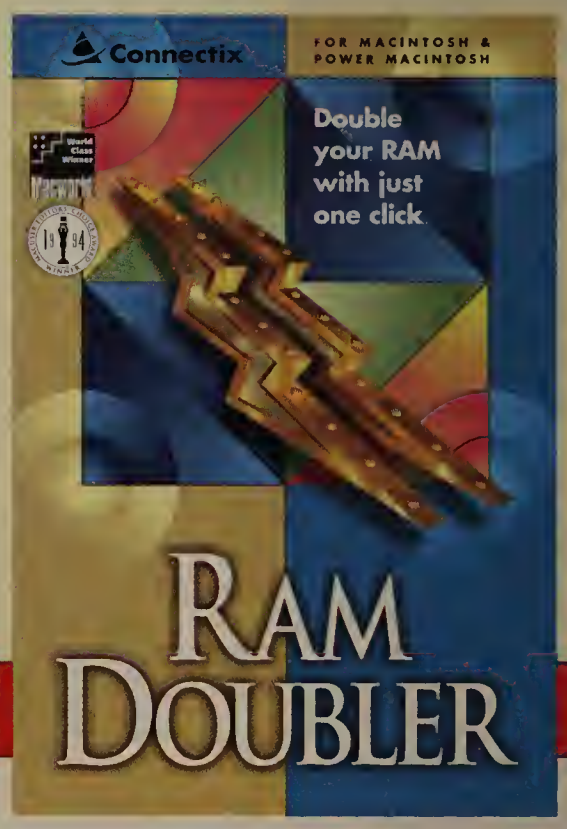

System Requirements: Macintosh equipped with a 68030, 68040 or PowerPC microprocessor. System 6.05 or later, including all versions of system 7 • 4 MBs required (hard disk required for machines with 4 to 6 MBs) • Not compatible with Mac SE, original Mac Classic, original Mac LC or PowerBook 100 or Mac II without a 68851 PMMU or any accelerator that does not work with virtual memory.

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Circle 192 on reader service card

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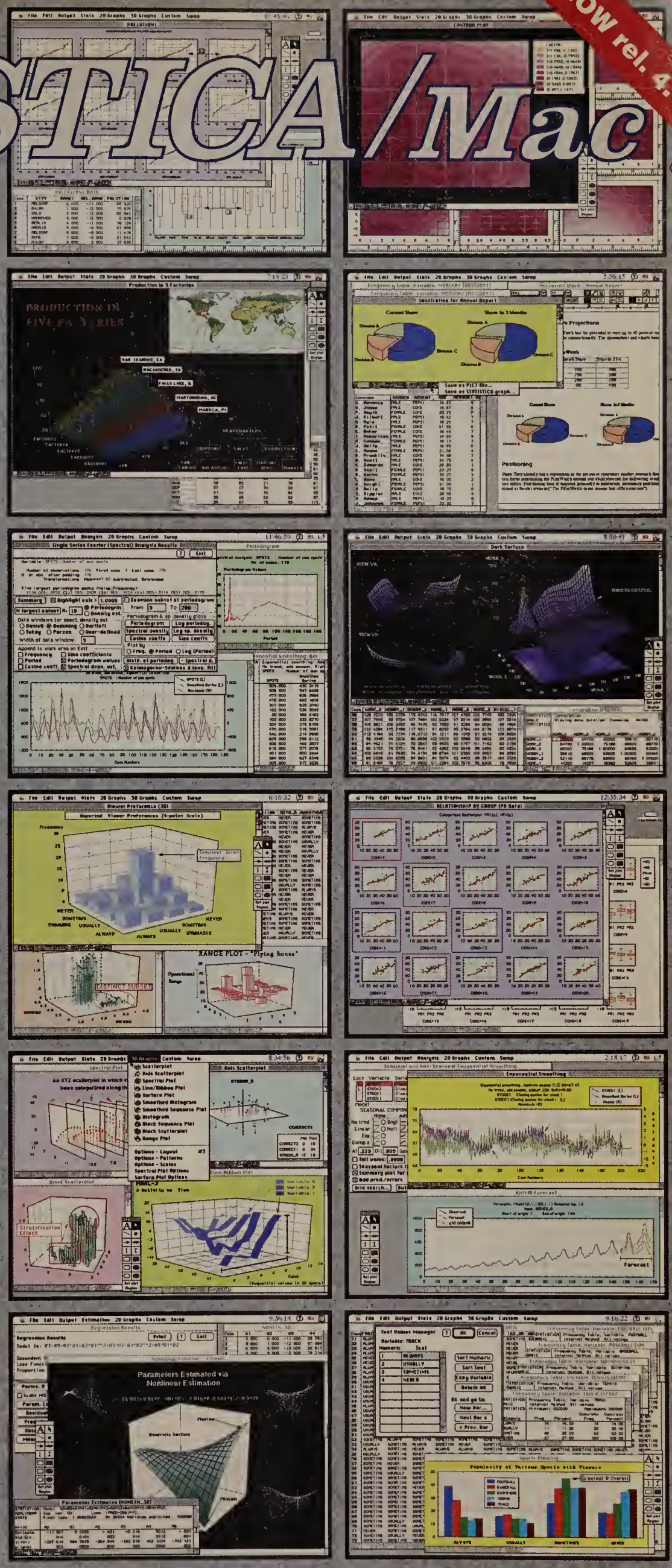

STATISTICA/Mac® A complete statistical data analysis system with hundreds of presentation-quality graphs integrated with all procedures ■ In-depth, comprehensive implementations of: *Exploratory techniques; Descriptive statistics; Frequency tables; Large selection of nonparametric tests; Stepwise multiple regression methods with extended diagnostics; General nonlinear estimation (with predefined or user-specified models); Logit/Probit analysis; General implementation of ANOVA/ANCOVA/MANOVA/MANCOVA (designs of practically unlimited complexity, repeated, nested, incomplete, random, changing covariates, contrast analyses, post-hoc tests, custom designs); Stepwise discriminant function analysis; Canonical analysis; Large selection of time series modeling techniques with forecasting; Factor analysis; Cluster analysis (incl. hierarchical, k-means, and 2-way joining); Reliability/Item analysis; Log-linear analysis; General survival/failure time analysis (incl. life tables, group comparisons, and regression models); Distribution fitting (a large selection of continuous and discrete distributions); Curve and surface fitting and smoothing (incl. spline, DWLS, NEXP, and others);* and much more ■ Manual with comprehensive introductions to each method and step-by-step examples (Quick Reference booklet explains all major conventions); balloon help ■ Extensive data management facilities: a super-fast spreadsheet of unlimited capacity with formulas (and *Publish and Subscribe*); merge/split files; "double identity" of values (numeric/text); BASIC-like data transformation programming language; Import/Export data and graphs from Excel, STATISTICA/w and other formats ■ Graphs integrated with all procedures (e.g., click on a correlation coefficient to produce the corresponding scatterplot and other graphs; click on a variable in the descriptive statistics table to produce a histogram and other graphs; click on an interaction effect in the ANOVA table to see a plot of interaction) ■ Large selection of 2-dimensional graphs: *Histograms (incl. multiple, clustered breakdowns, overlaid functions), Scatterplots (incl. multiple, weighted frequency, smoothed, function fitting), Multiple line and Range plots, Trend plots, Standard deviation plots, Data sequence diagrams, Contour plots, Box-and-whisker plots, Column plots, Bar graphs, Double pie charts, Scrollable dendrograms, Two-way joining plots, Curve fitting plots, Distribution comparison plots, Range plots, Probability plots, Amalgamation plots, Factor space plots, Casewise outlier and residual diagrams, ANOVA interaction plots, Multivariate (multiple) matrix plots, exploratory Draftsman plots with histograms, categorized (multiple) graphs,* and many other specialized plots ■ Large selection of 3-dimensional graphs: *3D surface plots (with data smoothing procedures, color or gray-scale shading, and projected contours), 3D scatterplots, 3D block scatterplots, 3D axis (space) plots, 3D spectral plots with adjustable planes, 3D line/ribbon plots, 3D sequence block plots, 3D histograms, 3D surface-smoothed frequency plots, and 3D range plots ("flying boxes")* ■ All 3D plots displayed in true perspective, feature interactive real-time rotation facilities (incl. continuous rotation) ■ Extensive graph customization options: all structural aspects of graphs (axes, scaling, patterns, colors, sizes, styles, regions, perspective, rotation, fitted functions, etc.); MacDraw-style tools with specialized "objects;" hi-res. graph and artwork embedding; page layout/preview; dynamic rulers ■ All output displayed in Scrollsheets™ (dynamic, internally scrollable tables: all numbers can be instantly converted into a variety of on-screen customizable, presentation-quality graphs) ■ All contents of Scrollsheets can be saved as data and used for input, or be exported ■ Flexible facilities to perform analyses on specific subsets of data ■ Extremely large analysis designs ■ Unlimited size of files ■ Extended precision ■ Unmatched speed (e.g., on a Mac IIfx, arbitrary rotation of a surface with 1000 points takes 1 second; correlation matrix 50x50 with 100 cases—less than 3 seconds; transposing a 5000 data points file—less than 2 seconds) ■ Full support for System 7 ("savvy") incl. *Publish and Subscribe*, Apple events, balloon help, "drag and drop," 32-bit, etc. ■ Price: **$695.**

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Windows versions also available (can exchange data with Macintosh versions): STATISTICA/w® **$995**; Quick STATISTICA/w® **$495.**

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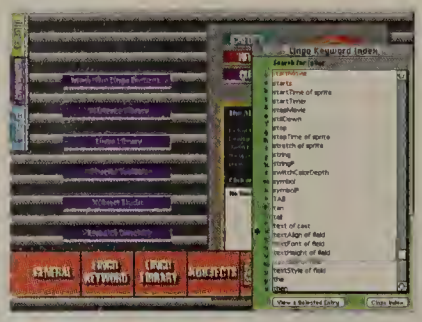
nearly 200 home projects. The product includes advice, hints, and reference guides; built-in calculators help you select building materials and estimate their cost. $29.95. Books That Work, 415/326-4280, 800/242-4546; fax 415/812-9700.

The Lost Mind of Dr. Brain
If you commonly feel as if you've lost your mind, you'll feel right at home with The Lost Mind of Dr. Brain. With this software, you solve puzzles and explore mazes to help Dr. Thaddeus P. Brain, who has accidentally transferred too much of his brain to Rathbone, his lab rat. Your mission: Return Dr. Brain's mind and make Rathbone a cheese lover again. The game includes 3-D graphics, a musical score, voices, and animation. For ages 12 to adult. $49.95. Sierra On-Line, 206/649-9800, 800/757-7707; fax 206/641-7617.

The Lost Mind of Dr. Brain

The MediaBook CD for Director
Now you can reuse code from the masters for your CD-ROM title—legally. A collection of information and tools for Macromedia Director users, The MediaBook CD for Director includes examples of products created with Director's scripting language, Lingo. Users can adapt the code for their own projects or simply copy and paste it into their own Director files. The CD also has more than 100 royalty-free XObjects for Director versions 3.13, 4.0, and 4.0.4, and Director for Windows. A Lingo library containing both known and undocumented Lingo features, a set of Director formatting tools, and a directory of additional resources round out the disc's offerings. $299. gray matter design, 415/243-0394; fax 415/243-0396.



The MediaBook CD for Director

Puppet Motel
First you should go to see multimedia performance artist Laurie Anderson live on stage, then check out her CD-ROM. Puppet Motel is Anderson's first performance piece on CD-ROM. It combines music, animation, video, choreography, puppetry, and poetry. Anderson gives you the opportunity to step out of the passive role of spectator to become a virtual collaborator. Experiment with clips taken from her animations and videography; arrange stars in the night sky; wander through the set of Anderson's latest tour, the Nerve Bible; and re-edit Dostoyevsky's *Crime and Punishment*. The disc also includes Anderson's description of developing the Nerve Bible material. $39.95. The Voyager Company, 212/431-5199, 800/446-2001; fax 212/431-5799, **http://www.voyagerco.com**.

The Sensational Surfaces CD-ROM
The first in Fractal Design's Really Cool Textures series contains 5 libraries of 20 textures each, including wood, paper, stone, tiles, and other surfaces. Designed for use with Fractal Design's natural-materials graphics environments, Painter and Sketcher, the textures are in the company's proprietary paper-texture format. You can use them to give objects realistic surfaces—oak, pine, walnut, parchment, papyrus, marble, and granite, for example—or to apply abstract geometric designs. $79.95. Fractal Design, 408/688-8800, 800/297-2665; fax 408/688-8836.

Super Wing Commander
Were you thinking that global peace lies just around the corner? Not by a long shot—at least, not when you are playing Super Wing Commander. In this CD-ROM game set in the twenty-seventh century. You become a pilot in the war against the Kilrathi empire, a race of aliens trying to destroy the Terran Confederation and humankind. This new version for the Macintosh has digitized sound, new graphics, and additional missions. $55 company's estimated price. Origin Systems, 512/335-5200; fax 512/331-9558.

Video Producer: A Video Production Lab
This tool teaches the basic skills of video production and provides hands-on training. Based on the work of author Herbert Zettl, the CD-ROM covers camera work, lighting, audio production, editing, and the video process. Aspiring videographers study each content area, take quizzes, and move on to complete a video-production project contained on the CD. $79.95. Integrated Media Group, 415/595-2350, 800/487-5510; fax 415/593-0499.

ACCESSORIES

Avery CD ROM Storage Systems
CD-ROMs have a tendency to accumulate like snowdrifts next to computers. To keep the data avalanche under control, Avery Dennison offers a line of portable and desktop CD-ROM storage devices that do away with jewel-box cases while still protecting CD-ROMs and storing their pamphlets. The line starts with the CDH-10 Flip-Style case, which holds 10 CDs with literature or 20 without. The RDC-100 Multimedia track system holds up to 100 CD-ROMs. CDH-10 $6.95, RDC-100 $24.95. Avery

continues

Break the speed limit.

Break the speed limit on your Mac with Speed Doubler™. It's software that installs in seconds, requires no hardware upgrades and takes your Mac to the next level of performance. You get faster access to the data you use most. Faster disk access. Faster Finder performance. And check this: Speed Doubler automatically doubles the emulation speed on Power Macs.

With Speed Doubler, Power Macs instantly run non-native applications twice as fast! For instance, recalculate a 5000 cell Excel 4.0 spreadsheet with Speed Doubler in 6 seconds, without it...13 seconds. Run a summary calculation of 1500 FileMaker Pro records in 90 seconds instead of 3 minutes. It's not magic. It's Connectix Speed Doubler. And if you own a Power Mac, you gotta have it. Get Speed Doubler today wherever fine computer products are sold. Your satisfaction is guaranteed.

Requirements: Macintosh equipped with a PowerPC, 68040 or 68030 microprocessor • System 7.0 or greater • 8 MB physical RAM or greater • Compatible with Connectix RAM Doubler • Not compatible with Mac Plus, Mac SE, original Mac Classic, original Mac LC or PowerBook 100

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Circle 68 on reader service card

Dennison, 909/869-7711, 800/942-8379; fax 909/598-2905.

CloseFlash and QuickPan
The CloseFlash optically redirects the QuickTake 150 digital camera's flash into a ring that surrounds the close-up lens. This provides even lighting with minimal shadows for close-up photography, according to the manufacturer. Kaidan also introduced the QuickPan, an indexed swivel mount for the QuickTake camera that makes it easier to create the seamless 360-degree panoramas needed for QuickTime VR. CloseFlash $149.95, QuickPan $109.95. Kaidan, 215/364-1778; fax 215/322-4186.

GlidePoint Desktop Mac

GlidePoint Desktop Mac
The original developer of Trackpad technology has brought the pointing device used on Apple's current PowerBooks to the desktop. To improve cursor control on larger desktop monitors, the GlidePoint Desktop Mac's touch surfaces are 30 percent larger than those on the 500-series PowerBooks. The device connects through the ADB port and ships with an ergonomic wrist rest. $99. Cirque, 801/467-1100, 800/454-3375; fax 801/467-0208.

Multi-Media Speaker Stands
Raising your external computer speakers a few inches above your desk can give you better sound—and free a few extra inches of precious work space. These speaker stands can help. Available in putty and black, the powder-coated wire stands have nonskid rubber feet. They store six CDs. $24.95 per pair. C-2 Office Gear, 312/327-9200, 800/282-2541; fax 312/327-9078.

Summa Expression
Summagraphics' 6-by-8-inch pressure-sensitive tablet lets users manage features such as pressure control and screen scaling directly from the tablet, without having to access a control panel. It's available with a cordless three-button pen, miniature mouselike pointing devices, or a pressure-sensitive pen. $389. Summagraphics, 512/835-0900, 800/337-8662; fax 512/835-1916.

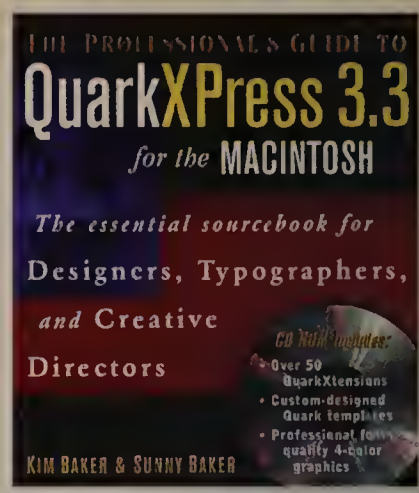
BOOKS

The Illustrator Wow Book
More than just a replacement for the manual, Sharon Steuer's book follows the approach used in *Photoshop Wow*, guiding the user through step-by-step exercises, tips for working more efficiently, and descriptions of how an artist created a particular image. The book includes a disk with tutorials, filters, and utilities. 224 pages. $39.95. Peachpit Press, 510/548-4393, 800/283-9444; fax 510/548-5991.

Looking Good in Color
Looking Good in Color teaches all levels of Macintosh and Windows users how to design and print in color. The book emphasizes practical advice as well as color concepts. Gary W. Priester covers the distinction between RGB and CMYK color-description modes, as well as creating custom palettes, using color scanners and color-matching systems, printing on a low budget, using duotones, and printing with varnishes and metallic inks. 300 pages. $29.95. Ventana Press, 919/942-0220, 800/209-3342; fax 919/942-1140.

Macworld Networking Bible, second edition
Chances are this book can tell you anything you want to know about setting up and managing a Mac network, AOCE, E-mail, TCP/IP, and multiplatform networking. Authors David Kosiur and Joel Snyder start with planning and installing a network and even unravel the mysteries of NBP BrRq. 687 pages. $29.95. IDG Books Worldwide, 415/655-3000, 800/762-2974; fax 415/655-3299.

The Professional's Guide to QuarkXPress 3.3
This book is aimed at desktop publishing professionals who know the basics but want to get the most out of QuarkXPress. Kim and Sunny Baker include tips and guidelines on using QuarkXPress to design page layouts, manipulate type, work with four-color graphics, and prepare prepress work. The book includes a CD-ROM with over 50 fully functional QuarkXTensions, along with typefaces, templates, and graphics. 672 pages. $39.95. John Wiley & Sons, 212/850-6630, 800/225-5945; fax 212/850-6799. m



The Professional's Guide to QuarkXPress 3.3

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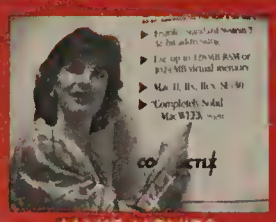
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"Push the buttons, yank the dial, click everywhere and see what happens. There is nothing to break."—Kai!

***Right now on Planet* HSC,** *a team of extraordinarily creative developers led by visionary Kai Krause are redesigning the face and direction of imaging software—and having a ball along the way!*

First, we unveiled **Kai's Power Tools**. And graphics designers grasped its awesome power to deliver unimaginable gradients, textures and fractals in a completely new way. Is there anyone who hasn't seen the Oscars or Super Bowl with graphics powered by KPT?

Then we published ***Live Picture***. And digital imagers turned their Macs into high-powered imaging workstations. Can anyone forget Gerald Bybee's Screaming Bride? Or the beautiful Dead Sea Scrolls Exhibition imaging by King Dexter?

We introduced **KPT *Bryce***. And 3-D pros and kids alike quickly made it the most popular new graphics program on the Macintosh as they created new worlds and landscapes. You've seen Bryce imaging in places as diverse as the new *Tetris* or a recent episode of *"Married with Children"*. John Dvorak, Jr. (all of 9) became an imaging monster on his Mac, using Bryce! You can too.

MacWEEK ★★★★★ · Publish ★★★★★ · MacUser United Kingdom · MacWorld MW ★★★★★

"Tonight Show With Jay Leno" backdrop

Video capture courtesy NBC

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Expanding Upon Your Photoshop Capabilities

Live Picture gives professional digital imagers unparalleled creative freedom and incredible productivity gains. Thanks to resolution independence, 48-bit color tools, unlimited size brushes, selective undo and near real time editing of gigantic images. For example, you can open, crop, rotate, scale and mask three 72 Mb high-res images in just seconds, instead of hours. Try that with a standard image editor!

"Live Picture is the future of image editing. It is to image manipulation what supercharger were to drag racing. Nothing like it has been introduced in the last 10 years."

—MacWEEK Magazine, February 1995

2.0 *Live Picture*

What a combination—Live Picture and Photoshop! Together they extend the power of your Macintosh workstation while letting you use the tools you already know. You'll easily handle more jobs in less time, composite high-res images like never before, and capture revenue only the "big boys" have enjoyed.

Just ask imager Richard Lund. He used Live Picture to composite the images that make up the colorful LA skyline backdrop for NBC's *"Tonight Show With Jay Leno."* For a job that was considered impossible for digital imaging, Live Picture delivered the goods.

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Just $995 SRP (of course, you can purchase it for a lot less), our new Version 2.0 extends your power even further with slick Photoshop integration, improved performance, new features like CMYK and color separation tools for prepress, expanded file and path support, convenient batch processing and lower memory requirements.

Start tapping into the most profitable imaging jobs around. Team Live Picture with Photoshop for unbeatable imaging productivity and creativity.

We launched **KPT *Convolver***. And image pros the world over applauded Kai's incredible new visualizer to design custom filter effects while providing such work horse functions as unsharp masking and Gaussian blur, all in real time.

KPT *Power Photos*' recent debut has already set a new standard in custom image libraries for production.

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Now we introduce **KPT *Vector Effects***, the ultimate application extensions for Illustrator, FreeHand and other compatible applications. We think you'll agree with Adobe and Macromedia, when they say, "Don't use our products without KPT Vector Effects!"

Creating new imaging and design capabilities by pushing beyond the boundaries of conventional software. Moving the entire bell curve of our customers' capabilities to the right, to higher levels of achievement, while providing an enjoyable experience. These are our goals. We trust you'll enjoy the ride.

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KPT *Convolver*

KPT Convolver provides unique, real-time custom filter creation and combinations of filter effects, instead of making you spend hours guessing and roaming dialog boxes. Why waste time and be limited to a small set of standard filters, when you can create incredibly rich, custom filters and effects for any image. Visualize in real time as you bring out the hidden beauty in any image! It's been called magic as well as *"a wonder to behold... our vote as the Photoshop plug-in software release to beat for 1995"* by the experts at *Design Graphics* magazine!

KPT Convolver is Kai's visual navigation interface to an incredible mathematical space, giving you instant access to creating custom blurs, sharpens, embosses, tinting, color, contrast, real-time unsharp masking, Gaussian blurring and other effects. Then tweak any image with sophisticated corrective controls.

Best of all, KPT Convolver watches how you work, then "Ping!" it rewards you with a star plus a cool new feature to help you work better and faster.

Ideal for Photoshop and Painter users, KPT Convolver comes with Color-It! 3.0 LE, one of our favorite paint and imaging programs—a $149 value FREE!—making it a complete standalone solution if you don't already own a host engine.

KPT *Vector Effects*

Eye-catching effects like distortion, warping and 3D extrusion once thought too difficult or simply impossible now take only seconds with Kai's newest marvel for your digital toolbox: KPT Vector Effects. It plugs into Illustrator 5.5, FreeHand 5.0 and other compatible products, giving you a baker's dozen of incredible extensions. Bevel embossing, perspective distortion, shadowing, shattering and neonizing are just a few cool effects you can apply to text or objects. Kai's easy-to-use interfaces let you work in real time, without leaving the host application. *"Vector Effects is a must have for every designer."*—Sean McKenna, Adobe Illustrator product line manager

"Oh what fun these guys have! And the products show it: Kai's Power Tools, KPT Bryce and Live Picture all demonstrate a vision of excellence and commitment to creativity. Everyone in the high-tech business can take a lesson from this creative and dynamic team! Thanks for the inspiration."

—High-tech columnist Michael Sullivan, February 1995

KPT *Convolver*™

The Ultimate Creative Filter Palette for Imaging Aficionados!

Need that extra "punch" when an image has a case of the smoggies? Maybe you want to find the edges, emboss with more or less relief, blur vertically while sharpening horizontally or select the precise unsharp masking or Gaussian blur level to apply to an image. KPT Convolver *is the only software that can do it!*

"... Convolver is one of those gotta-have add-ons that will make your life easier, make you more creative, and save you lots of time."—Publish, June 1995

KPT *Vector Effects*™

NEW!

Expanding Your Drawing Board

If you use Illustrator or FreeHand, here's the best way to make your day-to-day production jobs quicker, easier and more creative. "The well thought out interface and tools within KPT Vector Effects makes this collection of incredible applications from HSC the ultimate tion to Freehand."—James Von [illegible] and General Manager, Macro[illegible]

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We'll draw the lucky name on Sept. 1, 1995, and announce the winner at the Seybold Conference in San Francisco in September.

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Which graphics, drawing, illustration or other imaging software are you currently using?

- ❑ Kai's Power Tools
- ❑ KPT Bryce
- ❑ KPT Convolver
- ❑ Live Picture
- ❑ Adobe Photoshop
- ❑ QuarkXPress
- ❑ Specular Collage
- ❑ Adobe Illustrator
- ❑ Macromedia FreeHand
- ❑ Pixel Paint Professional
- ❑ Deneba Canvas
- ❑ Fractal Design Painter
- ❑ Strata StudioPro/Vision 3D
- ❑ Other_____

Which publications do you rely on for imaging and design information?

- ❑ Macworld
- ❑ MacWEEK
- ❑ Adobe Magazine
- ❑ MacUser
- ❑ Publish
- ❑ Other_____

❑ ***Yes.*** I want to receive ***Kai's World*** electronic newsletter.

❑ **YES!** Enter my name in your "HSC POWER MACINTOSH GIVEAWAY" drawing.

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© 1995 HSC Software Corp 6303 Carpinteria Ave , Carpinteria, CA 93013 Please note that offer is valid only in the U.S. and Canada and is void where prohibited Limit one entry per person Deadline for entries is Aug. 31, 1995 One name will be drawn by HSC Software at Seybold, with the winner notified by phone and mail Offer subject to change without notice

How the cover was done:

"The Digital Highway," created by John Lund/TeamDigital. Starting with a 72 Mb scan of a New Mexico highway, Lund composited and imaged the sundial, circuit board, compass and a single 35mm frame of film shot with a Leaf Digital Camera Back using Kai's Power Tools, Live Picture and Photoshop on a Quadra 950. Inset: "Palleagen," created by Impact Images. This image was shot with the Leaf Catchlight Camera and enhanced using Kai's Power Tools and Live Picture's colorization, silhouette, distortion and paintbrush tools on a Power Mac 8100/80. All other imaging produced with Kai's Power Tools, KPT Convolver, KPT Bryce, KPT Power Photos, KPT Vector Effects, Live Picture, Photoshop, FreeHand and QuarkXPress.

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"If you want to see what the Mac can do visually, buy this program."

—Joe Fasbinder, United Press International

KPT Bryce

Grab your first-class ticket to natural and supernatural 3-D landscapes, photorealistic backgrounds, breathtaking skies and never-before-seen worlds with incredible textures! In seconds, start rendering beautiful worlds you'd like to visit. Take control over elements in your world—sky, fog, clouds, water, terrains—using KPT Bryce's amazing materials engine and weather models.

Finally, here's a product easy enough for a child to master yet serious enough for experienced 3-D pros to go nuts over. In fact, the Discovery Channel's "NextStep" technology show called it "flaming amazing." It's so much fun, you may never turn off your Mac!

Bonus! KPT Bryce comes with a CD-ROM filled with gorgeous Bryce imaging and ready-to-use scene files—that's a $149 value FREE!

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The Ultimate in Plug-In Extensions and Filters!

KPT is the industry standard for powerful creative and production extensions, and is a must for any digital imaging tool box. Plug in KPT and bring out the best in Adobe Photoshop, Fractal Design Painter, Pixel Paint Professional and other plug-in compatible programs.

"If you can afford to buy only one filter package, Kai's Power Tools is the one!"

—Macworld, November 1994

Kai's Power Tools

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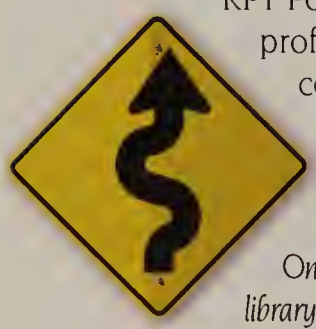
Kai's Power Tools is a complete, standalone solution! Color-It! 3.0 LE, an award-winning paint and imaging program, is included absolutely free!

KPT Power Photos



KPT Power Photos is professional custom photography shot by professional photographers. You get vibrant colors, unique compositions, and dozens of photographic backgrounds for all occasions—royalty free—far superior to standard, throwaway stock photography! Each 18 to 24 Mb image was carefully photographed for its depth, character and versatility.

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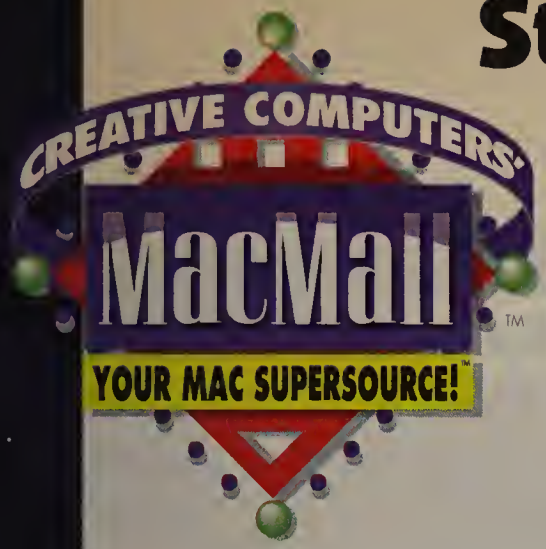

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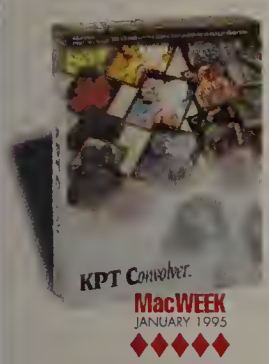

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MacWEEK, Jan. 30, 1995

The ultimate creative filter effects palette for imaging professionals!

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Killer plug-in application extensions for Illustrator and FreeHand!

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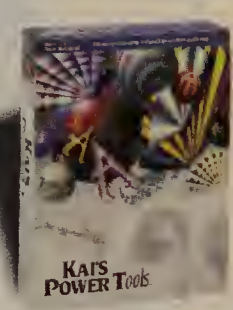

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Introducing the Apple Color LaserWriter 12/600 PS

The Apple output shown was printed on the Color LaserWriter 12/600 PS with all printer settings set to default. The Hewlett-Packard output shown was printed on the HP Color LaserJet with the PostScript upgrade and with all printer settings set to default except the halftone setting set to scatter dither (enhance
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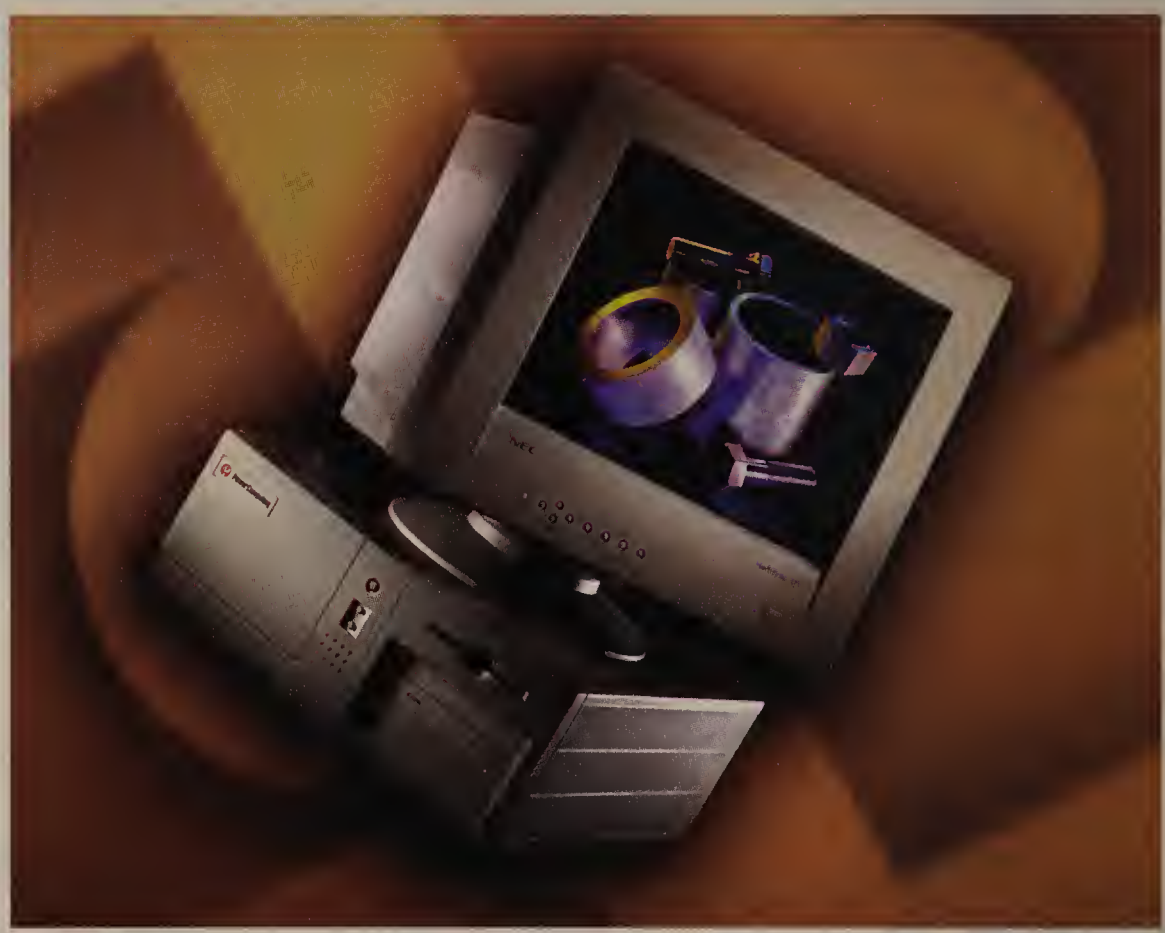
Reviews

Power 100

Macintosh Clone

PROS: Excellent performance; highly compatible with existing hardware and software; outstanding technical support; about $700 less than a comparable system from Apple; expandable. **CONS:** Relatively slow internal hard drive; minor errors in the user's manual. **COMPANY:** Power Computing (512/258-1350). **LIST PRICE:** Base model $2599 (tested configuration $3249).

MW ★★★★



MARK JOHANN

THE POWER 100 MAKES good on Power Computing's promise to create a high-performance Macintosh clone. It offers all the capability of an Apple Power Macintosh 8100/100, for about $700 less. In the Power 100's base configuration, $2599 gets you 8MB of RAM, a 730MB hard drive, Ethernet, a 24-bit high-performance video (HPV) card in addition to the built-in video, and a pile of software. Power Computing's competitively priced options include a larger hard drive, more RAM, more video RAM, a 14- or 17-inch monitor, a DOS card, and an internal quadruple-speed CD-ROM player. Possible future options include modems, Iomega's 100MB Zip drive, and a recordable CD-ROM drive. Power Computing has worked hard to ensure that you can get the computer you want; like DOS/Windows clone makers, Power Computing configures your computer to your needs at competitive prices.

Power Inside

On the outside, the Power 100 appears to be a typical PC in a baby-AT case—a common PC clone case. But looks are deceptive. Closer examination of the front panel reveals such Mac features as a restart button and a soft power-on button. Little Apple-esque icons adorn the back of the case. While standard connectors are in different places from what Mac fans would expect, they're all there.

On the inside, it's hard to find substantive differences between the Power 100 and a Power Macintosh 8100/100. Both systems use a 100MHz PowerPC 601 chip. Both have a 256K Level 2 system cache (Power Computing offers a 512K option), dual SCSI buses, three NuBus slots, and a PDS slot. The Power 100 supports up to 200MB of system RAM versus 264MB in an Apple Power Mac 8100/100 and 136MB in an Apple Power Mac 7100/80. Even the chip sets are the same: as part of its license and to ensure compatibility, Power Computing uses the same chips that Apple uses in its own Power Macintoshes.

Elbow Room

Cosmetic differences are obvious to anyone who has peeked into a Macintosh. To fit the motherboard within the baby-AT chassis while still providing all the features of a Power Macintosh, Power Computing completely redesigned Apple's motherboard. The most significant departure from Apple's design is a slotted daughterboard that has ports for all peripherals except ADB, internal video, and LocalTalk printing. There are ports for CD-quality stereo sound-out and sound-in, Apple AUI Ethernet, an external modem, a 2MB floppy drive, CD-ROM and audio-CD playthrough, an internal speaker, and internal and external SCSI buses.

Although the ribbon cables and wires connecting the daughterboard's internal ports to devices are messy, the daughter-

board gives Power Computing the flexibility to change peripherals options. For instance, Power Computing could include a 10BaseT Ethernet connector instead of Apple's AUI connector. The daughterboard also allows owners of early Power Computing systems to upgrade their peripherals' interface capabilities easily. At press time, future options were only in the planning stages.

The Power 100 can accommodate three 12-inch NuBus boards, with ample space left over where two more NuBus or PCI slots might fit in future models. The three drive bays are large enough to hold 3.5-inch or 5.25-inch half-height drives. However, a floppy drive occupies one bay, and in the configuration I tested, a quad-speed CD-ROM player filled another. The internal hard drive occupies a 3.5-inch bay that sits above the power supply. You can install yet another 3.5-inch drive on a side-mount bracket above the RAM banks. In a fully loaded Power 100, space is tight: full-size NuBus boards nearly touch the CPU's heat sink, and a side-mounted drive is squeezed in among the daughterboard, CD-ROM cables, and RAM SIMMs.

Like Apple, Power Computing ships its systems with an included HPV card or an Apple AV card ($349) installed in the PDS slot. Power Computing has redesigned Apple's HPV card to include both the standard Mac DB-15 video connector and a standard VGA connector. For now, an inconvenient internal DIP switch toggles between the two connectors, but Power Computing hopes to provide a better solution in the future.

More than Just Hardware

The Power 100's bundled extras are what truly distinguish it from comparable Apple machines. Unlike Apple's desktop systems, the Power 100 includes an Apple Design II extended keyboard and an ADB Mouse II. In addition to a modified version of System 7.5.1 on CD-ROM, the Power 100 includes ClarisWorks; Intuit's Quicken; Now Software's Now Utilities, Now Contact, and Now Up-to-Date; and the Bitstream Creative Collection CD that contains 121 PostScript Type 1 and TrueType font groups. Power Computing also provides FWB's CD-ROM ToolKit and Hard Disk ToolKit Personal Edition, and will soon add Insignia Solutions' SoftPC and a 90-day demo of SoftWindows to this list.

The box has documentation for everything except Quicken, and includes *Mac System 7.5 for Dummies*. The user's guide is clear and concise, but several diagrams contain errors.

Checking Out Customer Service

Service is arguably the factor that will ultimately determine the success of Macintosh clones. Low prices are compelling, but if something breaks, you need a safety net. Apple's history of poor technical support leaves a large void that clone manufacturers can fill. With an experienced staff recruited from Dell, APS, and Apple, Power Computing seems to have designed a robust support system.

Power Computing offers a standard one-year warranty on all of its models and guarantees a three-day turnaround on service. For a nominal fee—three years' coverage costs $119—users can purchase on-site service with one-day turnaround. The company hopes to solve most problems through stellar phone support.

Power Computing offers toll-free technical support from 8 a.m. to 8 p.m. (central time) every day. During a period when Power Computing was testing its technical support, a *Macworld* staffer called anonymously to check its quality. The technical support was remarkably good. With the technician's patient help, in less than 30 minutes we isolated a tough problem with an extension that works only intermittently on 100MHz 601 processors. The technician even pursued the problem with the company that created the extension, getting a reference number I could use to call the company directly, as well as giving me his own direct phone line and E-mail address.

Power Computing claims that its customer service representatives will check in with customers in the first days after purchase to make sure that they've received everything and that the system is in working order. Time will tell if the company can continue to provide such support when sales volumes increase, but at the moment, the support is excellent.

Works like a Charm

Fears of poor performance and incompatibility were unwarranted. In fact, the Power 100 bested the Power Macintosh 8100/100 by a small margin, and even turned in better numbers than the Power Mac 8100/110 on some tests. For example, the Power 100 took 98 seconds to evaluate a Mathematica notebook versus the 8100/100's 110 seconds and the 8100/110's 102.5 seconds. Typically, only a few seconds separated the performance of these three machines for any single test. For maximum performance, but without the Power 100's low price, check out Apple's new Power Macintosh 9500, the first Mac to use PCI, the replacement expansion bus for Apple's NuBus (see "First of a New Breed," in this issue).

Macworld Lab performed extensive compatibility tests with popular software and hardware. As we found out, the Power 100 shares with the Power Mac 8100/100 some problems caused by its processor, but otherwise the Power 100 gave us no difficulty.

The Last Word

Customers benefit from Power Computing's impressively low prices. The Power 100 offers the speed, expandability, functionality, and compatibility Macintosh users expect, with the customer support and prices we have wanted for so long.

—TIM WARNER

All the Speed of a Power Mac

= Best result in test. Longer bars are better.

Results are times as fast as a Centris 650 (Centris 650 = 1.0). Products are in decreasing order of overall performance.

*With Level 2 cache (256K), HPV video (default VRAM), 32MB of DRAM.

BEHIND OUR TESTS We reviewed a Power 100 with 16MB of RAM, a 730MB hard drive, a 4X CD-ROM player, and the Power Computing HPV card.

Personal Digital Assistants

Four PDAs

Envoy Wireless Communicator

PROS: Wireless messaging well integrated into Magic Cap interface. **CONS:** Current shortage of Telescript software limits usability; high cost for wireless service. **COMPANY:** Motorola (800/894-7353). **COMPANY'S ESTIMATED PRICE:** $1000 to $1500.

MW ★★★

Marco Wireless Communicator

PROS: Wide range of Newton software. **CONS:** High cost for wireless service. **COMPANY:** Motorola (800/894-7353). **COMPANY'S ESTIMATED PRICE:** $900 to $1400.

MW ★★★

MessagePad 120

PROS: Comfortable industrial design; wide range of Newton software. **CONS:** Poor integration with desktop PIMs. **COMPANY:** Apple Computer (408/996-1010). **COMPANY'S ESTIMATED PRICE:** $599, 2MB model $699.

MW ★★★

Sony Magic Link

PROS: Simple interface; strong communications features. **CONS:** Current shortage of Telescript software limits usability. **COMPANY:** Sony (800/571-7669). **LIST PRICE:** $699.95.

MW ★★★

MW LAB CONSIDER DICK TRACY'S TWO-WAY video wristwatch, Batman's utility belt, and the lapel-pin communicators from *Star Trek*. Science fiction has been promising powerful digital technology that fits in the palm of your hand for years. Can today's technology deliver? Two years after Apple introduced the first Newton, we took a look at four different personal digital assistants (PDAs). While these handheld computers have improved, we're still not ready to give up our paper-based daily planners.

Four Devices, Two Platforms

There are some features all these PDAs share: infrared data transfer between devices that use the same operating system, system software with basic personal-information-manager (PIM) functionality, and primarily pen-based data entry on touch-sensitive LCD screens. The screens all lack backlighting and require good ambient lighting to be readable. All the PDAs have 1MB of RAM installed, which serves as both system memory and storage memory for applications and files (the MessagePad 120 also comes in a 2MB version). You can provide expansion and additional storage primarily via low-power, high-speed PC (formerly PCMCIA) Card flash-memory cards, though prices of almost $100 per megabyte make the cards an expensive proposition.

The devices we looked at use two different platforms: the MessagePad 120 and the Marco both use Apple's Newton OS; the Magic Link and the Envoy use General Magic's Magic Cap operating system. Based on the metaphor of an endless pad of paper, the Newton OS allows you to have a blank sheet at all times for entering data. This setup focuses on data entry for forms, spreadsheets, and simple note taking. The applications are stored in a pop-up "drawer."

The Magic Cap OS, on the other hand, is a virtual desktop. Most of its applications exist as objects on the desktop. It uses a horizontal orientation that feels larger than the Newton's vertical work space. The Magic Cap software is built around Telescript, a programming language that embeds small programs, or agents, in messages sent from Magic Cap devices. Underneath an easy-to-use interface, these agents are capable of some sophisticated tasks, from scheduling appointments to rule-based E-mail filtering and delivery. The only problem is that a year after the launch of the Magic Cap software, developer tools for the platform are still scarce. To make the Magic Cap PDAs truly useful, General Magic needs to offer desktop client-server software that takes advantage of Telescript's powerful potential.

These two platforms approach their ideal users from different angles. General Magic emphasizes personal communications, so the Magic Cap software is true to the digital assistant concept where automated agents perform mundane tasks, freeing us to do more creative work. Magic Cap pushes PDAs closer to being smart telephones—contacting other people is the primary goal. The Newton approach is more pragmatic, attempting to replace the thousand tiny scraps of paper we generate daily with a single, silicon notebook. It's designed around information gathering and management, with the goal of uniting scattered data into a cohesive whole. Here are our impressions of each PDA after a month of use.

Digital Desktop The Magic Cap OS's approach is compartmentalized. You enter data into applications that appear as objects on the desktop, such as the contacts file and the appointment book. Magic Cap uses Telescript to integrate and synchronize this data between applications.

Digital Notepad The Newton OS is based on the metaphor of an endless roll of paper, storing data you enter in an object-oriented database (colorfully known as the "soup") that's easily accessed by all your applications. Write *Ramona* on a Newton PDA and it will scan the soup for any other references to *Ramona*, trying to link your data to other entries.

The MessagePad 120

The MessagePad series is two years old and as a result feels more polished than its younger competition. The Newton OS seems faster and more streamlined than the Magic Cap software and makes enter-

ing information on the MessagePad more pleasurable. The 2MB model of the 120 offers about three times the storage space of the other PDAs. This allows you to store more third-party software in the internal memory, thus saving the PC Card slot for add-on communications products and peripherals.

We both prefer the 120's design to that of any of the other products. The MessagePad just feels good in your hand. Add to that the satisfying performance we experienced with a range of Newton software, and you've got a solid PDA.

The Newton OS's handwriting recognition is still nothing to write home about, despite the ability to do deferred character recognition. But after we installed Palm Computing's text-entry software, Graffiti (see *Reviews*, May 1995), we were pleased by the ease of data entry. Because the Newton OS supports a wide range of applications for vertical markets, the MessagePad seems the best choice for specialized applications like medical and inventory work.

The Marco

The Marco is a slim black tablet that folds open like a book to expose the LCD screen. It runs on Apple's Newton OS. The major difference between the Marco and the MessagePad 110 is that Motorola bundles a radio modem with the Marco.

The Marco isn't as comfortable to carry as the MessagePad, though it's still nicely designed. It's heavier than the MessagePad, due to the radio modem, but still under the 2-pound mark. The nickel-cadmium batteries are meant to provide eight hours of use, but with the modem on full time expect to get about half that.

The radio modem is set up to use the Ardis radio network, which covers the United States fairly thoroughly. We noticed that the modem often provides coverage in areas where cellular phones won't function. RadioMail is the other part of the Marco's wireless package. RadioMail offers an E-mail address and 24-hour paging, supports outgoing faxes (via E-mail), and includes a cursory news and stock-quote service.

The RadioMail service is well designed, but it's pricey. RadioMail charges $49 monthly for the minimum service, but moderate to heavy users can expect to receive bills over $100. While an alphanumeric pager is cheaper, the Marco's ability to archive messages and its two-way communications make it an attractive option. CE Software still hadn't released its wireless QuickMail client during our testing, but the ability to log on to our office E-mail system (remotely and locally) would have been very welcome. If your organization already uses MessagePads, a Marco is an easy way to add wireless functionality.

The Magic Link

Sony's Magic Link was the first PDA to use General Magic's Magic Cap operating system. The Magic Link is a smooth, gray tablet that is used most comfortably held in two hands or placed on a desktop. The screen is horizontal and the work surface is easy to write on using the stylus or even your fingers. There's no built-in screen cover for the Magic Link, so most users will want to get a slipcover for it. It's designed for communication: short E-mail messages, phone calls, and appointment scheduling. Using the Magic Link for these tasks is a breeze, though nearly all the functions of a Magic Link require a phone jack for the internal 2400-bps modem. To get the most out of the Magic Link, you need to sign up with AT&T's Personal Link messaging service, which provides fax, paging, and E-mail capabilities. Compared with RadioMail, Personal Link is inexpensive (currently around $9.95 per month).

Our biggest complaint about the Magic Link is that only a handful of applications have been developed for it. The Personal Link service does offer support for Telescript, but only between Magic Cap users on Personal Link. That's fine if you expect to send mail only to other Magic Cap devices, but it's hardly a solution most users will be happy with.

The Envoy

Motorola's Envoy folds out the same way the Marco does, but it operates in Magic Cap's landscape orientation. It doesn't include a phone jack, instead assuming you'll use the wireless modem, though you can add telephone functionality via a splitter cable that plugs into the Envoy's external modem port.

The Envoy is equipped with the same radio-modem package as the Marco, but the RadioMail software for the Envoy is better integrated than the Marco's software. The Envoy uses Magic Cap's intelligent mail agents to customize how mail is delivered and received. If there were more Telescript-capable devices and applications available, the Envoy's communications capabilities would be even better. Still, the Envoy was our first choice for sending and receiving E-mail.

ROBERT PERRY

From left, Motorola's Marco Wireless Communicator, the Sony Magic Link, Motorola's Envoy Wireless Communicator, and Apple's MessagePad 120.

The Last Word

As we looked at these PDAs, strengths and weaknesses emerged, but no PDA had an overall advantage. If you're considering buying one of these digital valets, think hard about what you intend to use it for. Then spend some time in the store getting hands-on experience with the device before you buy.

The wireless modem can add great connectivity, but it adds $300 to the purchase price, and you can quickly run up a monthly bill over $100 for only moderate usage. We still consider alphanumeric pagers, remote-access–equipped PowerBooks, or simple telephone technology like voice mail to be better deals.

The basic truth is that as appealing as PDAs might seem, there's still not that much they can do that you can't do with a 49-cent pad of paper and a dime pencil. That's slowly changing, but while the current crop of PDAs have improved and added fairly impressive communications features, they're still too much of a premium product to recommend for all but that small group for whom convenience and connectivity are worth the price.

—LAUREN BLACK AND MATTHEW HAWN

24-Bit Video Boards

Three Graphics Boards

EAsycolor 24/1360

PROS: Enhanced resolution compatible with all multisynchronous monitors; superior Photoshop CMYK–mode acceleration on 680X0 Macs; good value. **CONS:** Slowest in many QuickDraw acceleration tests; no screen zooming. **COMPANY:** EA Research (510/867-0967). **LIST PRICE:** $1699.

MW ★★★

PaintBoard Prism GT

PROS: Acceptable QuickDraw acceleration; good software controls. **CONS:** Must enter Monitors control panel to change resolution; no Photoshop acceleration. **COMPANY:** RasterOps (408/562-4200). **LIST PRICE:** $999.

MW ★★★

Thunder IV GX 1360

PROS: Lots of software controls; ships with color-management software; can change resolution from pop-up menu; superior Photoshop-filter acceleration. **CONS:** Enhanced resolutions work only with specific Radius and SuperMac monitors; overly expensive. **COMPANY:** Radius (408/434-1010). **LIST PRICE:** $2999.

MW ★★★★

PCI (PERIPHERAL COMPONENT INTERconnect) is the bus of the Mac's future. While this means vendors have dramatically scaled back their NuBus development, the no-longer-"nu" bus technology isn't dead yet. In fact, most graphic artists continue to rely on NuBus video boards and accelerators—and will for some time to come. With that in mind, I found the latest batch of 24-bit NuBus video boards some of the most exciting that have ever crossed my desk. Three in number—the EAsycolor 24/1360 from EA Research, the PaintBoard Prism GT from RasterOps, and the Thunder IV GX 1360 from Radius—all are 7-inch QuickDraw acceleration boards that support 16 million colors at a resolution of 1152 by 870 pixels. The Thunder IV and EAsycolor 24/1360 also support higher resolutions and accelerate filters and CMYK editing inside Adobe Photoshop.

Speed and Software

All three boards provide impressive QuickDraw acceleration, but as I used the boards, I got a subjective impression that the Thunder IV and PaintBoard Prism were slightly faster than the EAsycolor 24. My unscientific conclusion was backed up by Macworld Lab's official tests, which show that the EAsycolor 24 is indeed significantly slower at scrolling documents inside Adobe Photoshop (in RGB mode) and Microsoft Excel—sometimes by a significant margin. However, the EAsycolor 24 did well when scrolling inside Microsoft Word and in the magnification tests, which require complete screen redraws. The Thunder IV was the fastest board overall, equaling its rivals in all but two of the scroll and magnification tests. The on-board video of the test computers—a Centris 650 and a Power Mac 7100/66—outpaced all three cards in two magnification tests, indicating that QuickDraw acceleration is generally less important than bus speed inside object-oriented programs such as QuarkXPress and Macromedia FreeHand.

When it comes to software controls, the EAsycolor 24 is the most austere and the Thunder IV is the most capable. The EAsycolor provides just one system extension—a simplicity I value in these days of garbage-laden System Folders. You access the bare-bones resolution and acceleration options via the Monitors control panel. The PaintBoard Prism, on the other hand, has two control panels; they allow you to customize shortcuts for zooming, panning, and changing the bit depth. You can even adjust the scan rate so it's an exact multiple of the NTSC 30Hz rate, thus eliminating the rolling black lines that show themselves when you videotape a computer screen.

But the Thunder IV provides far and away the most bells and whistles. You can automatically resize a window to fit a new screen size, select from five corrected gamma settings, and even set the screen to power off after a specified period of inactivity. (This last function turns off all the monitors connected to your Mac.) The board also ships with Radius's Color Composer, which lets you match on-screen colors to their print equivalents (see the sidebar "Simple Color Matching," in "The Color You Expect," *Macworld*, May 1995). Unfortunately, you're limited to using the A through Z keys when specifying shortcuts for zooming screen pixels. If you're an old SuperMac board owner used to pressing the arrow keys, you'll have to learn a new way.

Packing Pixels onto the Screen

On start-up, the Thunder IV and PaintBoard Prism allow you to cycle through resolutions by holding down specific keys; the EAsycolor 24 is the only board that insists on conforming to the monitor cable's sense code. This conformance

continues

How Do You Tell If It's A "Trinitron"?

© 1995 Sony Electronics Inc

Comparing 24-Bit Video Boards

= Best result for each test. Times are in seconds. Shorter bars are better.

	RUNNING PHOTOSHOP ON A CENTRIS 650*				RUNNING PHOTOSHOP ON A POWER MAC			
	Unsharp Mask	Gaussian Blur	Resample	CMYK Scroll	Unsharp Mask	Gaussian Blur	Resample	CMYK Scroll
EA Research EAsycolor 24/1360	77	46	58	37	40	25	29	37
Radius Thunder IV GX 1360	42	23	24	56	17	12	11	27
Internal Video	250	141	60	91	61	36	29	57

*1MB of VRAM installed for 16-bit color at 16-inch resolution (highest possible with internal video).

BEHIND OUR TESTS Settings for filter and resampling tests were Unsharp Mask at 200 percent and 10.0 radius; Gaussian Blur at 3.0 radius; Resample to 75 percent.

ensures that the board starts up with the optimum resolution, but it also prevents you from switching to other resolutions once you arrive at the Finder desktop. Unless you own a monitor that subscribes to Apple's latest multisynchronous specifications, you'll need to purchase a sense-code adapter (EA Research sells one for $29.95), which will allow you to switch resolutions. Even then you'll need System 7.5, which incorporates the new Apple Display Manager.

Both the PaintBoard Prism GT and EAsycolor 24 boards let you change the resolution of your monitor on the fly, but you must use the Monitors control panel and click on the Options button. (The Prism board requires an option-click on the Options button.) The Thunder IV has a pop-up menu of resolutions that you can access at any time; the Thunder IV's software also rearranges icons to fit on screen when you downsize the resolution (this function is also built into System 7.5).

The Prism board can display 1600 by 1200 pixels in 4-bit color, but at this resolution you can make yourself ill panning across the screen. Both the EAsycolor and the Thunder IV boards squish more pixels onto the screen at once, which is ideal for image-editing work. The Thunder IV GX 1360 supports 1360 by 1024 pixels in 24-bit color and 1600 by 1200 in 8-bit color. Unfortunately, these enhanced resolutions work only with specific Radius and SuperMac monitors; generic monitors don't provide the higher resolutions. The EAsycolor 24/1360 supports a slightly different resolution—1380 by 1040 pixels—in 24-bit color. Apparently, EA Research decided to include 1360 in the product's name (and make comparison with the Radius board more obvious). At any rate, the enhanced resolution works on any multisynchronous monitor, generic or otherwise.

Giving Photoshop the Gas

Both the EAsycolor 24 and the Thunder IV accelerate Photoshop functions. (The Thunder IV incorporates Radius's PhotoEngine accelerator as a daughterboard.) But how the two boards accelerate these functions and whose way is better constitute a debate between the two vendors. The EAsycolor includes an on-board RISC chip, which EA Research claims is roughly as powerful as two conventional DSPs. Ah, but the Thunder IV has four DSPs, so it must be faster, right? Well, not if you count the CPU on your logic board. The EAsycolor RISC chip works in parallel with the CPU, processing one half of the image while the CPU takes care of the other half. DSPs, on the other hand, do all the work while the CPU sits there and twiddles its thumbs.

Well, whatever your take on the RISC-versus-DSP argument, one point seems to be accepted by both sides: the EAsycolor's solution ensures that there is almost no slowdown when you switch to Photoshop CMYK mode, while the Thunder IV does a better job on filters. And that's what Macworld Lab found, too. In our tests, the EAsycolor board was generally every bit as fast at scrolling and magnifying in CMYK mode as it was in RGB mode. Unfortunately, the EA board lags considerably in the RGB tests and frequently continues to lag in CMYK. To give you an idea, the board was almost 200 percent as fast at magnifying as the Centris 650's on-board video and 250 percent as fast when scrolling. The EAsycolor was 150 percent as fast as the Power Mac's on-board video at scrolling, but perceptibly slower when magnifying. The Thunder IV tested close to the EAsycolor 24 in the magnification tests. It was 50 percent slower than the EA board when scrolling on the Centris 650, but 40 percent faster on the Power Mac 7100.

When it comes to filters, however, the Thunder IV accelerates more operations and does it better. The EAsycolor accelerates 8 filters, including the usual Blur and Sharpen crowd as well as High Pass. None of the filters carry the Adobe Charged seal of approval, meaning that the results may differ from what you'd see with Photoshop's unaccelerated filters. The Thunder IV accelerates 13 filters (anything with a radius value, plus Despeckle and Find Edges), 5 transformations, and 3 mode conversions—all with the Adobe Charged stamp. In our tests, the Thunder IV was 200 percent as fast as the EAsycolor at processing the Unsharp Mask and Gaussian Blur filters on both 68040 and Power Mac platforms, and a whopping 600 percent faster than the unaided Centris 650. The Thunder IV was also consistently 200 to 300 percent as fast at image resampling—which the EAsycolor does not accelerate—as any other tested video option.

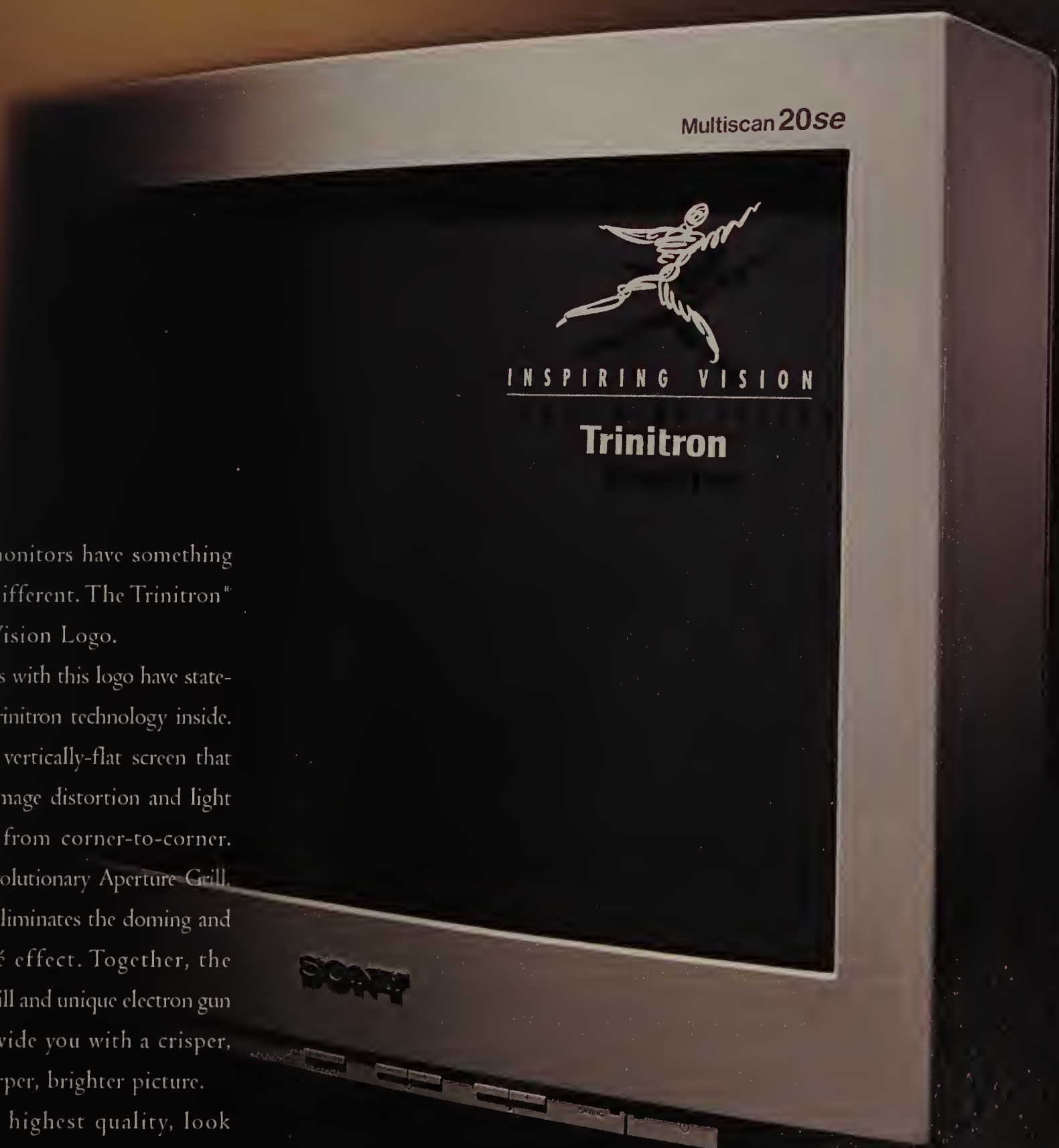
The Last Word

If I had to pick the best board from this bunch and price was no concern, I'd snap up the Thunder IV GX 1360, with its better QuickDraw acceleration, superior software, and impressive all-around Photoshop acceleration. But if price is a factor, the Thunder IV is nearly twice as expensive as the EAsycolor board and nearly three times the price of the PaintBoard Prism GT. For users on a budget, the EAsycolor 24/1360 may be a better solution. Admittedly, the software is minimal, but that's secondary. More important is the EAsycolor 24's helpful Photoshop CMYK–mode acceleration, universal high-resolution support for multisynchronous monitors, and generally adequate (though by no means stellar) QuickDraw acceleration. And finally, if you just want QuickDraw acceleration without the Photoshop stuff, the PaintBoard Prism GT performs admirably. You can find less expensive boards, but the PaintBoard Prism's plentiful software options make it worth a look.

Closing items: Both Radius and EA Research have announced plans to release similar PCI boards this year; RasterOps has no plans to release a PCI board. Also, both the Thunder IV and the EAsycolor 24 are available in different resolutions: the $2499 Thunder IV GX 1152 supports 1152 by 870 pixels in 24-bit color and 1600 by 1200 in 8-bit; the $3699 GX 1600 supports resolutions up to 1600 by 1200 pixels in 24-bit on supported monitors. Comparable EA Research boards are less expensive—the EAsycolor 24/1152 retails for $1299, and the 24/1600 lists at $2499.

—DEKE McCLELLAND

By The Picture On The Screen.



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SONY

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MW0

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If you own Aldus Persuasion or Microsoft Powerpoint, take the next step up. Get the Astound 2.0 for Macintosh and Power Macintosh competitive upgrade for just 99.95.*

MW ★★★★

MacWEEK ◆◆◆◆ ★★★★★ Publish

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Circle 77 on reader service card

Aladdin Desktop Tools 1.0

Productivity-Enhancement Utilities

PROS: Strong Copy, Trash, and printing enhancements; wide range of features. **CONS:** Uneven; minor flaws. **COMPANY:** Aladdin Systems (408/761-6200). **LIST PRICE:** $89.95.

MW ★★★

ALADDIN DESKTOP TOOLS (ADT) combines updated versions of older Aladdin utilities with modules based on shareware favorite SpeedyFinder7. Although ADT was ostensibly designed to complement rather than compete with existing utility packages, there is still substantial overlap. However, ADT offers some unique features in a combination that differs from other packages.

Extensions

Desktop SpeedBoost makes the Finder's Copy and Trash functions faster and more versatile. It can copy and delete files in the background, queue Copy and Trash operations, and view and delete queued operations. SpeedBoost's many options range from smart handling of transparently compressed files to a thoughtful ⌘-drag feature to move (not copy) files between volumes.

You can have SpeedBoost's powerful Replace feature automatically replace only changed files, preserving unchanged and more-recent versions. Or you can choose to be asked if you want to replace files; SpeedBoost lets you decide on a file-by-file basis, offers a "replace by date" option, and can merge folders with the same name rather than replace them.

Trash enhancements include options to empty the Trash at shutdown, delete locked files without asking, keep the Trash empty (by deleting items immediately), and overwrite all trashed files so they cannot be retrieved. (ADT also offers this last option on a per-file basis with Desktop Secure Delete.)

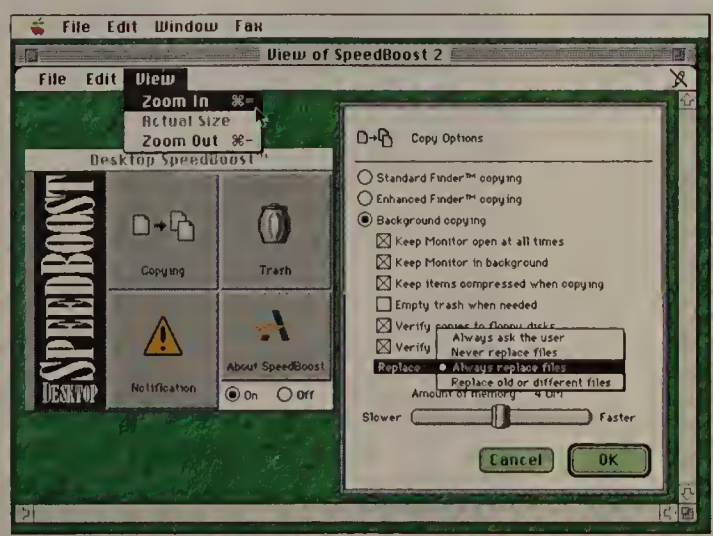
ADT's obvious competitors are Symantec's CopyDoubler and MSA's Copyright Pro, both of which offer a feature that SpeedBoost lacks: scheduled copying. But CopyDoubler's Fast Replace isn't as sophisticated as SpeedBoost's version, and Copyright Pro does a fraction of what ADT can do.

Desktop Makeover is a grab bag of minor goodies. It can turn off the Finder's window zooming and file-rename delay; it offers color icons for CDs, remote volumes, and different types of floppies; and it removes the balloon-help icon from the menu bar. I was disappointed, however, that I couldn't reclaim the "free" menu-bar space with my menu clock.

Makeover also features Document Linking, which replaces the "application not found" error message with a dialog box asking you to choose an application. Makeover remembers your choice, linking all documents of that type to the same application. Apple now includes this feature in System 7.5 as Macintosh Easy Open, but I found Makeover easier to use. Finally, Makeover's Menu Settings feature lets you assign ⌘-*key* combinations to your Finder menu items. While this is a nice idea, I found it awkward compared with Now Software's NowMenus (part of Now Utilities), which does this and more with much greater ease.

Desktop Shortcut enhances the Finder's Open and Save dialog boxes. It can take you straight to the last file or folder accessed; give you direct access to recently used and user-selected files, folders, and volumes via a pop-up menu; create new folders; and search for files by a variety of criteria. In short, Shortcut is on the same turf as Now Super Boomerang. While Shortcut has a few cool things that Super Boomerang lacks, they're insignificant compared with the latter program's additional features and greater elegance.

Desktop Magic Tools adds to Aladdin's Magic Menu extension, which is included in ADT. Magic Tools grants the Finder a few new functions, but not much magic. Get More Info gives you access to a few Finder flags, such as the Bundle bit, and to the Type and Creator codes for files. Yet it omits things that appear in the Finder's Get Info window, such as Finder Comments and the custom-icon box. Make Alias To lets you save an alias of a selected file with a standard Save dialog but lacks a hierarchical menu of common destinations, which would save steps and time. The Copy/Move function has the same flaw. Lastly, Gather takes a group of selected files and puts them in one folder, but you can gather files from only one volume at a time. Magic Tools can be useful, but it feels like a job half-done.



View Review The second menu bar makes Desktop Viewer confusing, but it is handy for viewing this PICT file of SpeedBoost's powerful copy options.

Applications

ADT's Desktop Printer puts double-clickable, drag-and-drop printer icons on the desktop, which makes choosing an output device a snap—with one important exception. If you have different types of devices using the LaserWriter 8 driver, Desktop Printer can't switch PPDs (PostScript Printer Descriptions), so you still need to use the Chooser. Still, this is a simple, elegant utility. Let's hope Aladdin can deliver a completely LaserWriter 8–friendly version soon.

Desktop Viewer is a drag-and-drop, read-only file viewer that can open virtually anything, though not always in a practical manner. Out of the box, it can view text, sound, PICT, and (with QuickTime) JPEG files. Other file formats can be viewed with XTND translators (not included). With files that lack translators, Viewer defaults to the Programmer's View, which lets you see both data and resource forks.

Viewer lets you copy selections from within any file and save a complete copy of any file, but it doesn't allow you to save selections. This is restrictive. With more-extensive save options, Viewer could be as handy as Abbott Systems' CanOpener.

Oddly, Viewer menus appear in the document window, rather than in the menu bar. This is awkward and disturbingly Windows-like. On the plus side, Viewer functions are accessible directly from Magic Menu and Shortcut. Despite its quirks, Viewer is versatile and useful.

The Last Word

Aladdin Desktop Tools has an impressive array of features. They're not all perfectly implemented, but Desktop SpeedBoost and Desktop Printer make the package worth its $50 street price; and the rest could be considered a bonus.

—PETER M STOLLER

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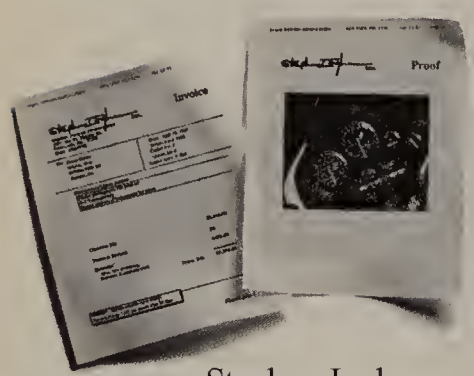

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Circle 137 on reader service card

KPT Convolver 1.0

Photoshop-Compatible Filter

PROS: Allows novices and experts alike to access powerful convolution kernels; multiple undos inside the filter; three flexible modes for applying incremental effects. **CONS:** Cannot preview effects within context of full image window; can't zoom previews inside dialog box; requires an FPU. **COMPANY:** HSC Software (805/566-6200). **LIST PRICE:** $199.

MW ★★★★

IF YOU'VE EVER USED THE CUSTOM filter that's included in Adobe Photoshop, you know just how difficult creating your own special effects can be. Though the filter is powerful—allowing you to design sharpening, blurring, edge-detection, and color-embossing effects you can't otherwise access in Photoshop—Custom requires you to enter integer values into a five-by-five matrix of option boxes; Custom then alters a pixel based on the brightness of its neighbors. Even if you actually know exactly what you're doing, you very likely rely on a small repertoire of settings over and over again. It's a shame, too, because the Custom filter boasts literally millions upon millions of unique variations.

The idea behind HSC Software's KPT Convolver plug-in module is to unlock these millions of effects. Named after the so-called convolution kernels that Photoshop's Custom filter maps onto each of the selected pixels in an image, Convolver not only allows you to explore these effects inside a relatively intuitive interface, but it also lets you apply a separate kernel independently to each of the color channels in an image. This means you can sharpen one channel, apply edge detection to the second channel, and emboss the third channel. Unlike Adobe Systems' Aldus Gallery Effects and other plug-in collections that employ predefined kernels to produce highly limited (and frequently bland) effects, Convolver allows you to freely explore an unrestricted range of kernels to create whatever effects you deem most appropriate.

Three Ways to Convolve

Convolver offers three ways to approach convolution kernels—the Explore, Design, and Tweak modes. Rather than working entirely independently, each of the modes builds on the other modes. For example, you can rough out a convolution kernel in the Explore mode, refine it in the Design mode, and apply the finishing touches in the Tweak mode. This is quite a handy setup for designing incremental effects. You can also reverse functions applied in any mode by taking advantage of the 200 sequential undos that Convolver provides.

Much like the Texture Explorer included with HSC's Kai's Power Tools, Convolver's Explore mode features 15 random variations on a selected image. Click on a variation, and it becomes the base image for 15 new variations. The Design mode also supplies 15 variations, but you can control these by specifying axis parameters. For example, you might explore increasing light variations on the left and increasing embossed variations on the right. If you want to combine two variations into one effect, you can drag between them, a technique the manual calls scrubbing. You may have to read the manual to get up and running with these two modes, but the options are well designed and functional.

Convolver's Pet As you work with Convolver, the plug-in awards you up to five stars, four of which deliver a new function. One offers a before-and-after split-screen preview of the image (1), another displays a color wheel when you change the hue and saturation (2), and a third lets you store up to nine settings as you work, on the off chance you might want to revisit one (3). The last function cycles through variations in a continuous animation.

In the Tweak mode, you adjust individual kernel attributes by dragging from buttons that serve as invisible slider bars. As you drag, your cursor vanishes and a numerical readout explains the extent of your edit. This approach simplifies the interface by eliminating the need for a column of technical-looking slider bars. However, the vanishing cursor routine serves no practical purpose, and I wish the number would remain visible next to the button after you stop dragging so you could easily stay abreast of how much tweaking you had applied. The good news is that the effects are cumulative, so you can combine, say, blurring and edge-detection, something that requires a feat of mathematical reasoning inside the Custom filter.

Not all of Convolver's capabilities are available when you first start using the plug-in. As you progress, Convolver awards you a total of five KPT Power-User stars, four of which give you access to additional functions. (The first star is merely a heads-up that lets you know that more stars are on the way.) It's a gimmick, to be sure, but it's not completely without merit. There is something to be said for unfolding the program as the user gains experience, and the new features are themselves highly useful (see "Convolver's Pet"). Just be sure you back up the plug-in module so that you don't have to earn the stars all over again in the event that something goes wrong with your hard drive.

The Last Word

In Latin, *convolvere* means "to enfold." My concern is that Convolver does a little too much enfolding. The interface consumes an entire 13-inch screen with only enough room to spare for the menu bar. This means you have to work exclusively inside the filter with no way to preview the effect in context within the image window. (You can reduce the dialog box's size to see the underlying image window, but the image window remains unfiltered, so this doesn't help with previews.) Considering that you can't see deselected areas within the relatively diminutive preview diamond, and can't even zoom out to see more of the image at one time, this is a fundamental drawback. While Photoshop's Custom filter most assuredly does not offer Convolver's wealth of exploratory options, at least it lets you clearly see the effects of your edits.

Still, you can't help but appreciate a program that presents powerful convolution kernels in such an imaginative and absorbing package. Though it requires an FPU to run, KPT Convolver ranks right up there with Xaos Tools' Paint Alchemy and the Explorer/Designer modules included with Kai's Power Tools as one of the most exciting and potentially useful filtering options available for the Mac.

—DEKE McCLELLAND

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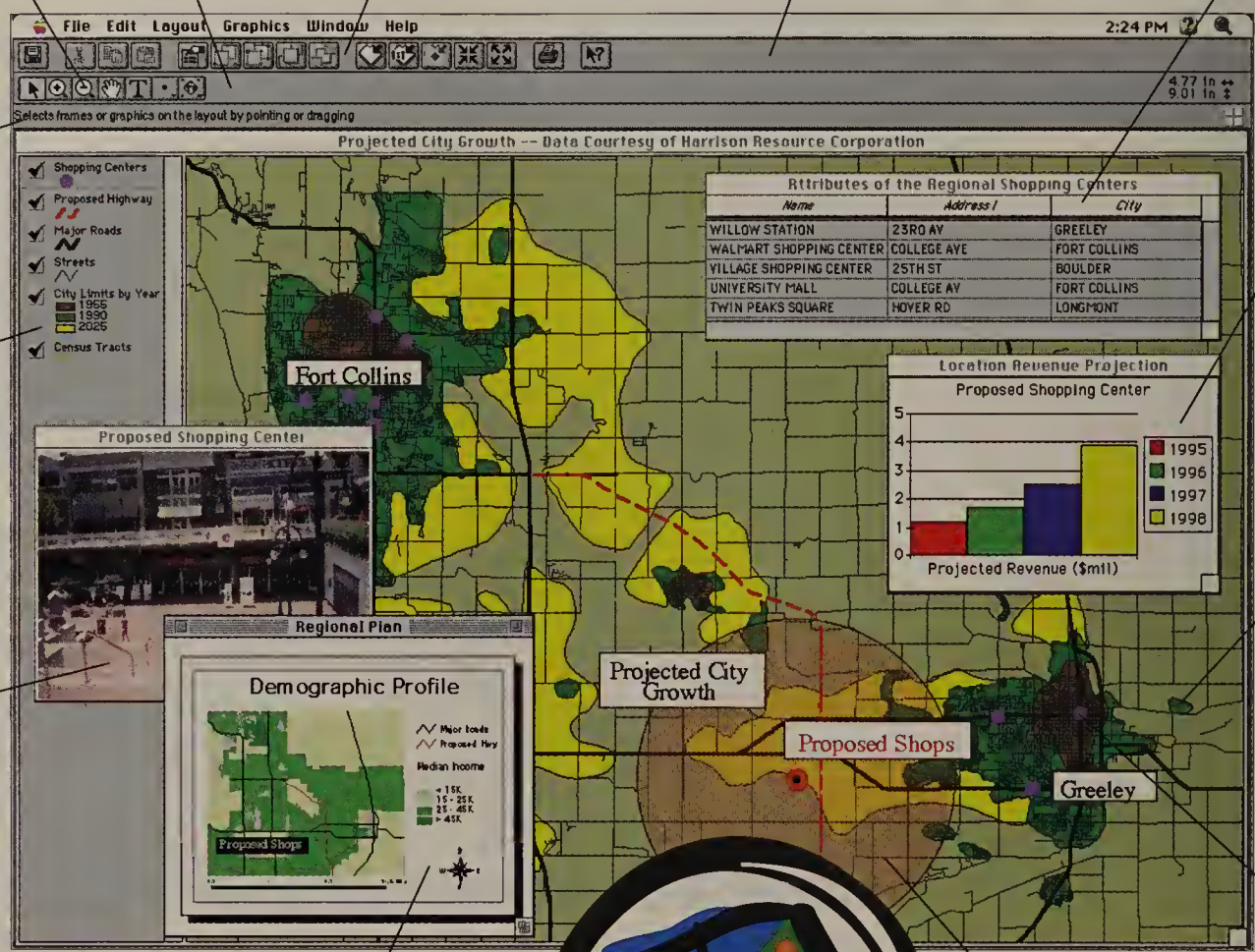

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Saber LAN Workstation

Network-Management Software

PROS: Comprehensive data collection; remote virus scanning; unattended remote-user updating.
CONS: No alarms or traps; no trend or graphic reporting; buggy, incomplete SNMP support.
COMPANY: Saber Software (214/361-8086).
LIST PRICE: $199 plus $49 per node.

MW ★★★

MACINTOSH LANS ARE GETTING trickier to administer, thanks to the growing number of generic printers, bridges, routers, terminal servers, and personal computers. And Macintosh software products themselves have sophisticated installers. Keeping it all working can be a challenge. Saber LAN Workstation (SLW, formerly GraceLAN) is a LAN-management package that promises to automate the process with two programs: Network Manager for network administration, and Update Manager for remote software updating.

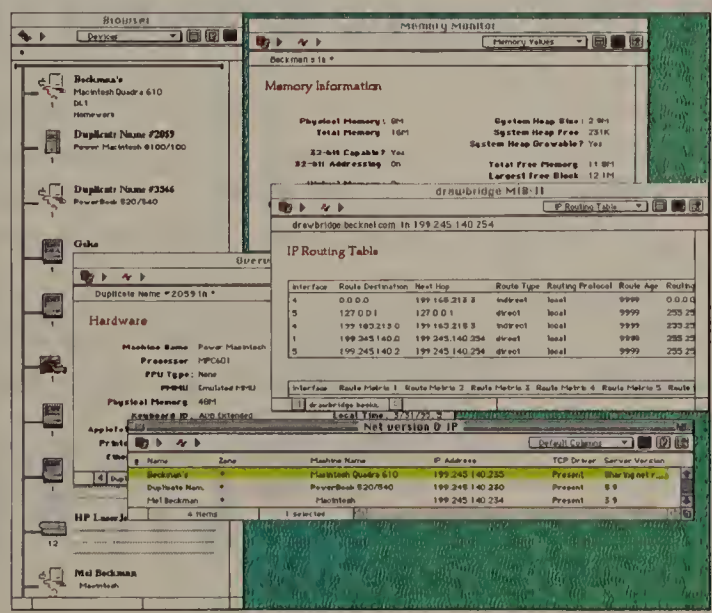
Managing the Net

SLW's Network Manager component consists of responder extensions that you install on each computer to be managed, and an application program that you run on your central administration Mac. (SLW includes a responder for DOS machines, but they must have their own PC-based AppleTalk software, such as Farallon's PhoneNet PC.) When you install each responder, you can configure it to report customized identifying information, such as user name. The responders run in the background, collecting configuration data and usage statistics and reporting them to the Network Manager application on demand.

Network Manager queries responders on a configurable schedule, displaying devices either as a list that you can sort by any heading item; as a topological map; or in detail, one device at a time. Retrieved data includes a detailed hardware inventory, software and fonts installed, available volumes, currently running processes, and networking information. You can view data items by category, or you can design your own list reports with selected items across categories. SLW also gives you some control over remote systems, with commands to shut down or restart, send a file or message, and synchronize clocks. You can even perform remote virus scans (using the commercial program Datawatch Virex, purchased separately). A change-report feature shows differences between any two data samples.

In addition to AppleTalk-specific data collection, SLW supports Simple Network Management Protocol (SNMP) data collection, a standard in TCP/IP networks. SNMP uses an information database, called the Management Information Base (MIB), to query remote devices about their status. SLW includes three separate MIBs: an AppleTalk MIB, a Macintosh MIB, and the official MIB-II for TCP/IP. The first two MIBs let you retrieve usage statistics from devices running Apple's MacSNMP software (part of the AppleTalk Connection package, available from Apple for no charge). The MIB-II lets you query TCP/IP devices, such as smart bridges, routers, and terminal servers. Although SNMP is a read-write protocol supporting remote device control, SLW supports only reading MIBs. The SNMP feature lets you gather usage statistics not available from the SLW responder.

Network Manager works well but has a few blemishes. It lacks triggers to generate alerts on preselected events, and it doesn't provide for trend analysis or the graphic display of gathered usage information. These are features most LAN administrators want. The SNMP support itself lacks individual community name support, which is necessary in security-conscious LAN environments. A community name is similar to a password, and in other systems each monitored device can have a unique name. Network Manager requires that you manually change the current community name every time you query a device, which can make monitoring secure networks inconvenient. The SNMP functions also cause occasional crashes, a problem that Saber Software says it will fix in a future release.



View of the LAN Saber LAN Workstation's Network Manager lets you monitor your LAN through a number of views. Topological views graphically map out your LAN by zone. Customizable list views display periodically updated data items. Detail views report data items by category.

Managing Change

SLW's Update Manager is a useful tool that lets you propagate virtually any kind of software upgrade to remote users. Updating is a three-step process. First, you prepare a package of the program components to be installed. You specify where the components should be placed on the remote user's Mac, and whether existing versions should be replaced. You also specify which users are to receive the package, and you provide any minimum system requirements. Second, you distribute the package to users using SLW's built-in file-distribution queue, which you can configure to send files unattended at night. Third, after each user receives the package, SLW uncompresses and installs it, either automatically or at the user's convenience. If any components require restarting the Mac, Update Manager informs users of this and lets them defer the installation to a later time. Update Manager has built-in security and tracking features that help ensure safe updates with a clear audit trail.

Update Manager is nicely executed but has some rough edges. For example, it forces you to manually collect the items to be updated—a time-consuming and error-prone process—and it can't install individual resource objects, such as sounds or fonts. Saber promises a utility called InstallerWatcher to automate package building in a future release of SLW. InstallerWatcher will compare the files on a system before and after running a software installer and then create the component list and list of target locations that are ready for Update Manager to use. Saber will distribute all updates, including InstallerWatcher, in Update Manager form through its online support BBS.

The Last Word

Although SLW lacks some of the niceties of network-management software for other platforms, it's still a useful tool for the price. You could easily spend several times the cost of SLW on more-sophisticated products, but SLW is quite adequate for getting your feet wet in the network-management game.—MEL BECKMAN

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Color It 3.0

Paint Program

PROS: Multiple undos; customizable toolbox; unusual pressure-sensitive tablet controls; straightforward Unsharp Mask filter; Levels and Curves; independent channel editing; CMYK separations; excellent convolution capabilities; a rare bargain. **CONS:** Inadequate eraser tool; can't cancel some operations; no support for Photo CD or JPEG formats. **COMPANY:** MicroFrontier (515/270-8109). **LIST PRICE:** $149.95.

MW ★★★★

ONCE UPON A TIME, PAINT programs and image editors of all varieties and price ranges roamed the Macintosh environment with the same degree of freedom and bonhomie once associated with the bison that roamed the grassy plains of the Old West. But then Adobe Photoshop rode into town and blasted everything within a 10-gigabyte radius to smithereens. Of the 20 or so paint programs that used to cavort so happily on my screen, only 3 hearty old-timers dared venture into the light last year—Fractal Design's Painter, Pixel Resources' PixelPaint Pro, and MicroFrontier's sturdy little Color It.

Granted, Photoshop is a wonderful application with amazing capabilities, but it's simply too much program for novices and intermediate users. And at $895 retail, only professionals can reasonably afford to buy it. That's where Color It comes in. Version 3.0, which is Power Mac–native, is a robust pixel editor for inexperienced artists and casual graphics enthusiasts. It offers the standard collection of painting and selection tools along with a hefty supply of special effects and precision editing functions. But the best news is its price, slashed to half the previous version's. More than a year ago, MicroFrontier gave away several thousand copies of the program for the price of the disk. Until August 31 of this year, MicroFrontier is offering a $49.95 competitive upgrade program, not just from other graphics products, but from page-layout, word processing, and integrated applications as well. A hungry vendor with a good product is what I call an ideal combination.

High-End Options for the Rest of Us

In addition to Color It's unique and impressive capabilities from versions gone by—which include multiple levels of undo, a customizable toolbox, intuitive color controls, uncommonly flexible selection and masking tools, expert antialiasing and feathering options, and support for Photoshop plug-ins—version 3.0 offers a handful of powerful new features that boost the program's power and value. You have total control over pressure-sensitive input. You can even specify that increased pressure make a line lighter or thinner, rather than darker or thicker—a surprisingly useful alternative. A new Unsharp Mask filter lets you focus images with a degree of precision equaled only by Photoshop and PixelPaint Pro.

Color It also simplifies things by presenting Photoshop's Radius option as a more straightforward Intensity slider bar (see "A New Twist on an Old Sharpener"). The options aren't as precise as they are in Photoshop, and the previews are more static than in Photoshop, but the filter serves its purpose well without overwhelming the uninitiated.

Color It also muscles in on Photoshop's color-correction territory with its Levels and Curves commands. Again, neither of these functions equals its Photoshop counterpart, but you can expertly adjust brightness and contrast and even edit individual color channels, a new high for programs under $200. You can also edit color channels independently using the standard paint tools and special-effects filters. Color It now provides CMYK separation options. And though the program lets you edit each CMYK channel separately, you can never see more than one channel at a time, making it extremely hard to tell what's going on, especially if you're a new user. (As Photoshop users know, CMYK editing takes a big toll on your computer's processing capabilities.)

A New Twist on an Old Sharpener You can now sharpen the focus of an image using Color It's Unsharp Mask function, which includes previews and a straightforward slider bar. I drew the lines with a pressure-sensitive Wacom tablet. For the red lines, I specified that the strokes should get thinner as I pressed harder, and I specified that the yellow lines should get thinner as I let up. I also applied a special blending mode to the yellow lines to achieve a translucent effect.

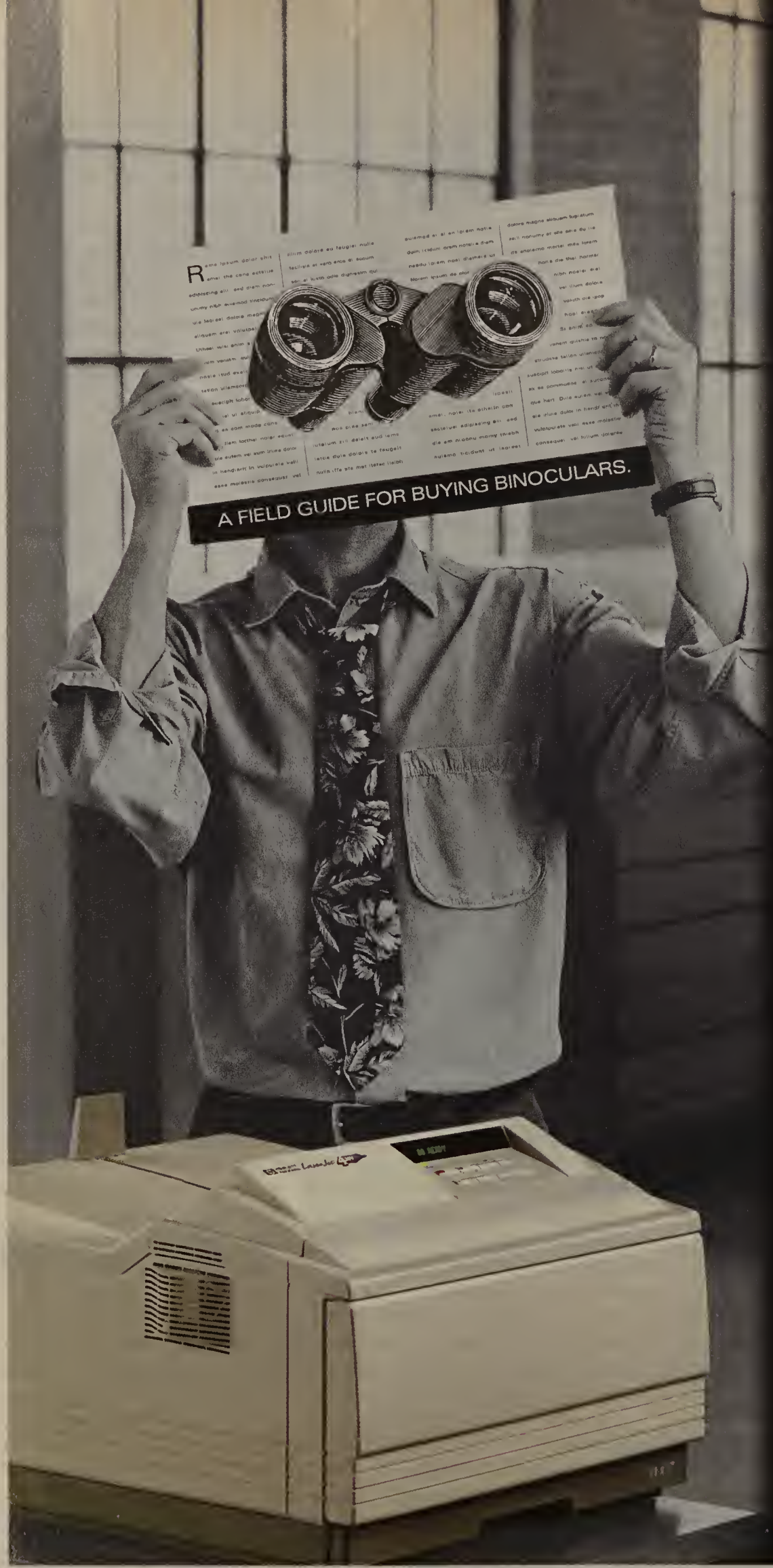
Among Color It's best and most surprising capabilities are its convolution functions. Made popular by Photoshop's Custom filter and HSC Software's KPT Convolver, convolutions are numerical pixel-by-pixel operations that result in fascinating edge-detection and embossing effects. Color It performs some amazing and unusual tricks of its own, offering an accessible collection of presets—renamed since version 2—along with a tool that actually applies convolutions as you paint. The latter function packs a powerful punch, kind of like a sharpen or blur tool on steroids. My favorite function, however, is a convolution editor that actually helps you design your own filters. While it's beyond the capabilities of most intermediate users, anyone who's attempted to use Photoshop's Custom filter will appreciate the convolution editor's extra amenities immensely. If you ask me, every one of these items ought to be standard equipment in Photoshop.

After all this gushing, I must admit that Color It 3.0 isn't likely to lure a single experienced user away from Photoshop (although the convolution functions may be tempting to many). The focus filters and color-correction functions aren't as sensitive; the eraser tool is hard-edged (and a bug prevents it from reverting properly in version 3.0); the program doesn't support Photo CD or JPEG; you can't cancel operations from the keyboard; and you can't quickly revisit a filter dialog box—just to name a few items on the shortlist. Rather, Color It offers its own distinct and sometimes superior features that cater especially to nonprofessional users. At the same time, the program bears a strong enough resemblance to Photoshop that experienced folks can come to terms with Color It after very little effort. And you just couldn't ask for a more affordable price.

The Last Word

Frankly, I can't think of a better program for learning how to create graphics on the Mac. With so many old paint programs fading into the sunset, it's gratifying to see that good ones like Color It survive.

—DEKE McCLELLAND



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Color Compass 1.0

Color-Management Utility

PROS: Multiple levels of undo; intuitive drag-and-drop interface; supports major graphics programs; creates palettes from PICT files.
CONS: Can't resize or reorder swatches in custom palettes; can't search for colors by name.
COMPANY: Praxisoft (703/729-3391). **LIST PRICE:** $129.

MW ★★★

VIRTUALLY EVERY GRAPHICS PROgram includes tools for editing colors and creating custom palettes. But Color Compass, a utility that does nothing but mix, blend, and edit colors, provides speedy, specialized tools that allow you to blend, match, and tweak colors in subtle ways not possible in most programs. And if you work with a variety of graphics, page-layout, and multimedia programs, you can save time by exporting a customized Color Compass palette for use in all those programs.

The program provides a number of ways to create colors. The Color Blend window allows you to work with two-, three-, and four-color blends. Simply pick the colors you want to blend (from a preexisting palette, the Apple Color Picker, or by setting specific RGB or CMYK values), and load them in a blend window by dragging color swatches into position. The program instantly creates a multicolor gradient based on the colors you selected. You can then drag the cursor along the gradient to select a new color.

You can also extract colors from PICT files to create palettes based on existing images. Color Compass automatically creates a palette containing color swatches of the 256 colors that appear most frequently in the image.

Once you've selected a color, you can tweak it further using the program's other palettes. The Color Edit palette lets you create warmer/cooler and darker/lighter variations. The Tints & Shades palette allows you to add varying degrees of black or white. Still another palette finds and displays, as color swatches and by name, the six standard Pantone colors that most closely match the selection.

Dragging a color swatch into the center of the Color Family palette produces more variations. The color wheel displays a color's complement (its opposite on the color wheel), double complements (the two colors midway between a color and its complement), and triadic complements (the two colors equidistant from the original one on the color wheel).

The Color Compass interface makes all this color manipulation quick and easy, employing a simple drag-and-drop approach. To edit colors, you simply drag color swatches from palette to palette. To add a color to a new palette, you drag a swatch to an open palette window.

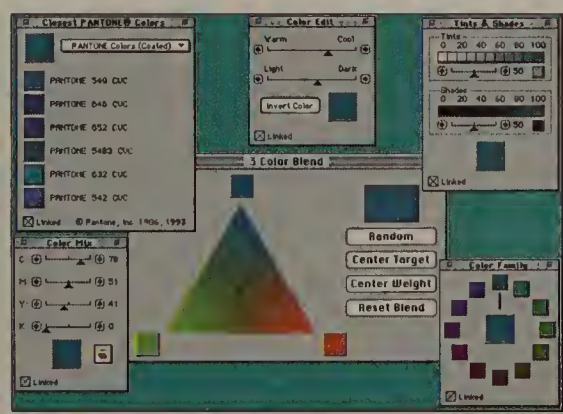
To speed things up even more, you can link the palettes so that adjusting the selected color in a blend window automatically updates that color in all the other palettes simultaneously. Shortcuts are numerous: you can open and close every palette with a single keystroke; option-clicking on a color swatch displays its color information in RGB or CMYK percentages; control-clicking on a gradient lets you reweight the blend, controlling the rate at which the colors melt into each other across the gradient. Also, the program handles up to 99 levels of undo, which allows for experimentation.

Once you've created and gathered the colors you want, you can export your finished palette for use in Macromedia FreeHand, Adobe Photoshop, PageMaker, Illustrator, and other popular graphics programs. (Praxisoft now provides a free upgrade that supports QuarkXPress.)

For a program that offers so much flexibility and convenience, Color Compass has limited palette options: you can't drag palette colors into a new order or resize the displayed color swatches. Also, you can't search for a color by name.

The Last Word

Expert graphic designers generally know how to make a color warmer, darker, cooler, or richer simply by adjusting the appropriate CMYK values. But Color Compass is a useful, well-designed utility for organizing colors, and it's especially helpful for those who would like more visual feedback and assistance in creating colors for use in other applications.
—JOSEPH SCHORR



Mix and Match The six interlinked palettes in Color Compass allow you to combine colors; make them darker, lighter, warmer, or cooler; match them to their Pantone equivalents; and calculate their opposites on the color wheel.

Insta Software

Relational Databases

PROS: Inexpensive; include ready-to-use forms and templates; require little training or setup.
CONS: Limited flexibility; sparse documentation.
COMPANY: Chang Labs (408/727-8096).
LIST PRICE: $29 per module.

MW ★★★

MANY BUSINESSES COULD BENEfit from a relational database to track clients, vendors, invoices, sales, and so on, but buying and setting up a relational database is typically an expensive, time-consuming, and programming-intensive process. Chang Labs' Insta Software series is a notable exception. The company's preprogrammed, ready-to-use database products are inexpensive and easy to use, and each module offers genuine relational database capabilities.

These small, no-frills packages are designed for very specific markets. Insta Printer, for example, is a contact manager for commercial printers and copy shops. All the forms a printer is likely to need—work orders, design-job estimates, delivery memos, and so on—are built-in and ready to use. Insta-Photographer handles contacts, invoicing, and other record-keeping tasks for commercial, retail, and wedding photographers. The Insta Software series also includes databases specifically for contractors, real estate agents, and consultants, plus general-purpose business products for creating invoices, mail merge, and managing contacts. Each product is priced at $29.

These programs lack the tools to design a database. You can't create your own fields, design new forms, set up custom reports, add graphics, or create calculation or summary fields. You can't change fonts, sizes, styles, or colors, and you can't even delete existing fields. Everything is completely preset. While this limits flexibility, it also means you can use the database straight out of the box.

Operating an Insta database is pretty straightforward. Most commands are button-driven, and the data links and calculations you need to create documents and reports are built-in. For example, to create a new invoice or work order for a client, you simply select a contact record, then choose the type of document you want to create. The program links the document to the contact, automatically transferring all the appropriate contact information into the document. After you

continues

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enter price and quantity, you click on the Fill button, and the program does all the math on forms, calculating totals, subtotals, taxes, and so forth.

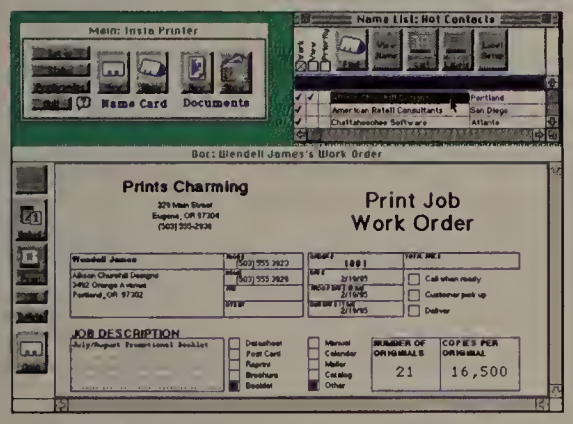
Because the database is relational, the data in all linked documents is updated automatically. Revising a contact record to reflect a new address, for example, automatically updates all linked invoices, letters, and other documents. Locating information is also fast and efficient. To find a record, you type the first few characters of a name into the Company field; as soon as the program recognizes the name, it brings up the record.

Though personalized options aren't plentiful, the Insta programs do give you some control over the arrangement and display of information. You can organize contacts into 13 different groups, or views, and display each view separately. Also, you can define keywords to categorize and search for contacts. You can combine Insta modules to create a more sophisticated system, such as adding mail merge capabilities to any of the programs by buying the mail merge module.

Documentation is sparse—instructions for all ten Insta Software products are covered in 24 pages—and far from comprehensive, but you get lots of help in the form of Apple Guide tutorials. Unfortunately, you need at least System 7.5 to use Apple Guide. While most features of the Insta programs are self-explanatory, better documentation would simplify using the sophisticated features, such as setting up keywords and filters.

The Last Word

At $29 each, the Insta Software programs are a great deal; you get a tool to manage business contacts effectively with a setup time of literally a few minutes. If you can live with Chang Labs' functional but simple approach, you'll save a lot of money and time in the end.—JOSEPH SCHORR



Instant Paperwork Insta Printer includes the templates you need to generate work orders, invoices, estimates, and other business documents. New documents are automatically linked to information stored in the contact database. Multiple windows let you view individual contact records, lists of contacts, documents, contact histories, and schedules.

FastTrack Schedule 3.0

Project Scheduler

PROS: Arranges activities in outlinelike hierarchy; can paste graphics on Gantt charts; offers shortcuts palette; can save multiple display setups; can filter and sort activities. **CONS:** Shortcuts palette cannot be customized; all workers must have same work calendar. **COMPANY:** AEC Software (703/450-1980). **LIST PRICE:** $299.

MW ★★★

WITH THE RELEASE OF FastTrack Schedule 3.0, AEC Software has increased the capabilities of its project-scheduling program without compromising the simplicity. Project schedulers come in a variety of shapes and sizes, but the basic premise is creating a graphical project timeline called a Gantt chart so you can compare the planned schedule to the real thing.

FastTrack Schedule lets you customize many aspects of a Gantt chart. Aside from selecting time periods (from hours to years), you can set start and end dates for a project, design new symbols for activity bars and milestones, paste graphics onto the chart, add new columns of information, and selectively show certain phases of your project.

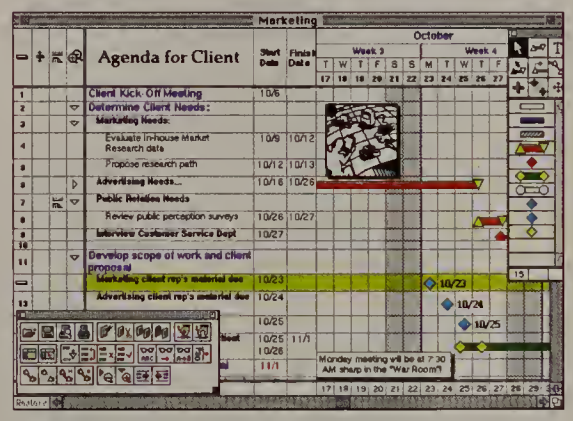
FastTrack Schedule's new detailed calendar lets you select particular workdays for your project. The Work Hours option now lets you choose discontinuous work periods, so you can skip lunch hours when planning the actual time for a project. However, you cannot define different work calendars for different workers, so you can't plan for part-timers' hours or different workers' schedules.

When you create a Gantt chart in FastTrack Schedule, you can set up a hierarchy of tasks and subtasks, and use this outlinelike hierarchy to simplify your chart's appearance. You can collapse your project to only the major tasks, for example, hiding the details of each subtask.

To help control and customize your Gantt chart, FastTrack Schedule has added four new formatting columns, called action columns, which you can display to the left of your Gantt chart. The first column contains the number of the row; you can use this column to select the entire row or a contiguous series of rows. The second column, Move Activity, allows you to drag rows up or down. The third column lets you set page breaks anywhere in the chart, while the fourth column can expand or collapse the outline levels. You can display any or all of these columns at any time.

FastTrack Schedule makes changing resources or contractors within a schedule a simple process with the new find-and-replace feature. You simply type in the text string you want to change and the replacement text, and FastTrack makes the change automatically. I found this feature particularly useful for changing personnel and resource assignments.

FastTrack Schedule's report capabilities were limited in the past, but the new version's have been improved. Using the new filtering option, you can select items that meet your criteria, such as a particular worker or time period, and FastTrack displays only activities that relate to that item. You can also sort either the entire project or a set of activities filtered according to a selected item. You can save filtered layouts for reuse.



Simple but Powerful Tools This Gantt chart has a graphic and a text note pasted into the chart area. The four new action columns are on the left: a page break has been inserted after task 7, and task 6 has been collapsed to hide its subtasks. The new shortcuts control palette is on the lower left.

FastTrack Schedule has added a control palette for various menu shortcuts, such as filtering, sorting, or expanding and collapsing tasks and subtasks. Similar to the shortcuts palette in ClarisWorks, this control palette can be resized from the default 1-by-28-icon palette strip to any size that fits your screen. However, unlike ClarisWorks, FastTrack doesn't allow you to define and add your own shortcuts to the control palette.

The Last Word

Unless you often require extensively detailed reports of your project's resources or need to link related project schedules, I recommend FastTrack Schedule for project planning. The control palette and action columns have improved its interface, and features such as filtering, sorting, saving multiple display setups, and the new work calendar have increased its power.—DAVE KOSIUR

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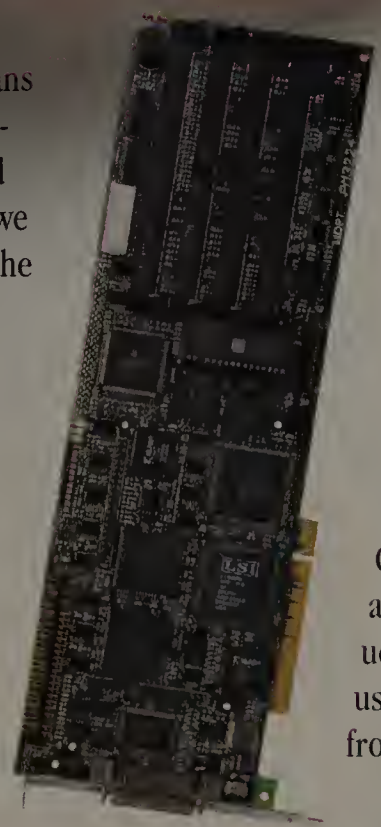

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TelePort Platinum

Fax Modem

PROS: Consistent, reliable connections; fast fax performance; QuickDraw GX fax driver. **CONS:** Doesn't support V.terbo; minimal modem-status displays. **COMPANY:** Global Village Communication (408/523-1000). **LIST PRICE:** $279.

MW ★★★★

GLOBAL VILLAGE'S TELEPort Platinum weighs just 10 ounces, but this Mac-only fax modem offers V.34 (28.8-Kbps) data and 14.4-Kbps faxing capability. The Platinum also provides an incoming-call-recognition feature—which allows users to juggle voice and fax calls, as well as an answering machine—all over a single telephone line, without requiring a switch box.

The Platinum ships with version 2.5.3 of Global Village's highly regarded GlobalFax software. This newest version includes native PowerPC code for its fax driver and viewing engine, so it can deliver high performance on a Power Mac (the software also provides 680X0 code). The newest features include a QuickDraw GX fax driver, gray-scale fax support, and an extremely flexible address book that can store calling-card numbers. The OCR module is average, providing decent text translations of documents that have clear text.

The Platinum handles faxing with little fuss, and the quality is excellent, although gray-scale faxes, even those sent in the highest-quality mode, tend to have a dithered look. While faxing from QuarkXPress, I did receive a warning about a potential reliability problem, but I ignored the message and successfully faxed several complex documents to their destinations.

ROBERT PERRY

The GlobalFax software uses the TelePort control panel to set default modem-port speeds, connection protocols, and speaker volume. The control panel also provides a Maximum Throughput setting (115.2-Kbps), which capitalizes on an AV's or Power Mac's high serial-port speed. However, this affects only the transmission of data between the computer and modem; it doesn't affect the modem's connection speed. (Global Village says a software update, offering higher serial-port capability for all Centris and Quadra models, should be available on its BBS and Internet server by the time you read this.)

The Platinum's status displays are minimalist. The modem has three green lights: one signifies that the modem is on, one indicates that you're connected, and one flashes during data transmission. The TelePort control panel displays only whether the modem is ready or connected; you don't see the modem protocol or connection speeds as you do with Global Village's PowerPort line.

Previous Global Village modems (except the Gold II) used AT&T data pumps (the modem's controller chips), but the TelePort Platinum uses a Rockwell chip set to achieve V.34 performance and provide the call-discrimination feature. The Rockwell chips don't support the V.terbo (19.2-Kbps) connection standard offered by Global Village's Mercury line, which may be a disadvantage if you also have a V.terbo modem.

The Last Word The Global Village TelePort Platinum performs well, and the latest incarnation of the company's fax software offers a terrific combination of speed and quality, all at a competitive price.
—GENE STEINBERG

Snatcher 1.0

Internet-Access Software

PROS: AppleScript support; allows multiple-site connections and file transfers; allows browsing during file transfers. **CONS:** Difficult to cycle through open windows. **COMPANY:** Software Ventures (510/644-3232). **LIST PRICE:** $49.95.

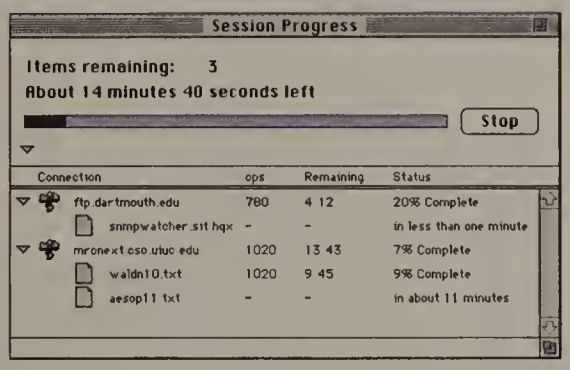
MW ★★★★

ONE OF THE JOYS OF SURFING THE Internet is searching through FTP (file-transfer protocol) sites, which archive everything from the frivolous to the indispensable. For years the standard FTP tool has been Fetch, developed at Dartmouth College. Popular World Wide Web browsers can also access FTP sites, but the newest and best such tool is Software Ventures' Snatcher, a simple, scriptable, and robust FTP client.

Snatcher does everything Fetch does, and then some. While Fetch allows you to connect to only one FTP site at a time, Snatcher lets you connect to multiple sites simultaneously.

But Snatcher's real power lies in its file-transfer capabilities. Fetch can download only one file at a time, and it prevents you from browsing until the transfer is complete. Snatcher, however, allows you to transfer several files at once, whether from the same FTP site or from several FTP servers. While you're downloading, you can also connect to other sites or continue to browse. During a file transfer, Snatcher displays a dialog box indicating the transfer status of each download, as well as the total time remaining for all transfers (see "Minutes to Countdown").

Snatcher's interface employs a Finder-like approach. For instance, you can choose to view items in FTP-site directories by the same criteria the Finder offers (kind, date, icon, name, and so on). You can copy files from an FTP site simply by dragging their icons to your desktop or to a folder on your hard drive, rather than navigating to your download destination via a dialog box, as you must do with Fetch.



Minutes to Countdown When downloading files with Snatcher, you can view their status and the time remaining in the transfer.

My one complaint about Snatcher's interface is its lack of a menu item for cycling through the open windows that can quickly clutter a screen. You must click on each open window to find the site you want.

What also makes Snatcher a keeper is its extensive AppleScript support, which streamlines such mundane FTP tasks as connecting to a server. The product includes scripts for connecting to more than 100 popular FTP sites. While connected to any FTP server, you can make an alias for connecting to that site simply by invoking the Make Alias feature. If a site is busy, you can drop its alias onto the Busy Buster AppleScript, which tries to connect to the site repeatedly until it succeeds. (Using Busy Buster, I connected to Stanford University's popular FTP archive—during peak hours—in about a minute.) Other scripts handle errors, count the number of items in a folder, or retrieve a file and then quit.

The Last Word If your FTP needs are minimal and your wallet is thin, Fetch—which is free to educators and nonprofits, $25 when used commercially—is extremely capable. But if you want multiple, simultaneous connections and file transfers, the ability to browse while downloading, and useful scripting features, you should switch to Snatcher.—JOANNA PEARLSTEIN

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TransJammer

Video Transition Effects

PROS: Excellent quality; large selection; Power Mac native. **CONS:** Slow on 680X0 Macs; manual lacks illustrated list of transitions. **COMPANY:** Elastic Reality (608/273-6585). **LIST PRICE:** $149.95.

MW ★★★★

TRANSITIONS ARE THE spice of video life. Scene A dissolves into scene B, a title peels away to reveal a different scene beneath—these are mainstay seasonings in a video producer's kitchen. They can be overused, but in appropriate amounts, they enliven and enhance a video.

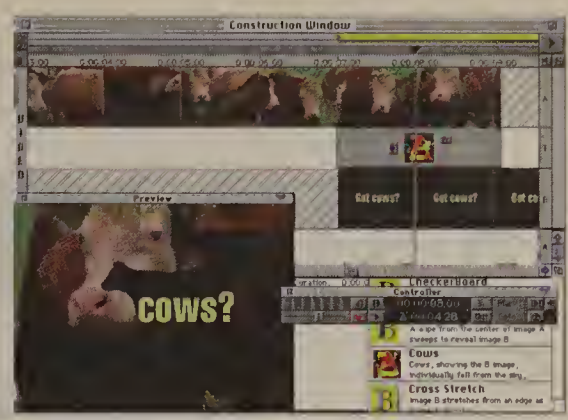
Elastic Reality's TransJammer is a collection of 100 transition effects for Adobe Premiere and Avid VideoShop. TransJammer operates as a plug-in for these programs, so it's easy to learn—simply install it in the plug-ins folder, and its effects become available.

Kind of. You don't actually see 100 new effects in your Transitions window. Instead, you see a single new entry for TransJammer. Drag its icon to the project window, positioning it between the A and B scenes for which you're creating a transition, and choose the effect you want from the subsequent dialog box.

This approach eliminates cluttering the Transitions window with 100 new effects, most of which you can customize to yield hundreds more. If you find you use some effects constantly, you can build stand-alone versions of them, which appear in the Transitions window, just like the transitions that ship with VideoShop and Premiere.

So what's included? There are classic as-seen-on-TV transitions: a rotating cube that explodes to reveal a new scene, for example. There are variations on common effects: one scene wipes another off the screen, but in a herky-jerky way. There are all-business effects: scene A is gradually replaced by an animated bar chart whose bars contain scene B. And there are effects you're not likely to see on "World News Tonight" any time soon: scene A is replaced by profiles of cows—yes, cows—falling from the top of the screen to the bottom, while scene B appears within each cow's shape (see "Got Cows?"). This effect alone makes TransJammer a must-buy for every video producer in the dairy industry.

Unfortunately, you'll spend much time clicking to discover what each effect does. TransJammer's manual desperately needs a section illustrating each effect; some tips for customizing them wouldn't hurt, either.



Got Cows? One TransJammer transition you probably won't want to milk: cow outlines fall from above, revealing the image in the next scene.

The quality of TransJammer's effects is as good as anything you'll see on television. If you have a 680X0 Mac, though, give yourself time, because TransJammer all but demands a Power Mac. In my tests, a one-second transition that took nine seconds to render on a Power Mac 7100/80 took over a minute on a Quadra 840AV.

The Last Word Many of TransJammer's effects are corny, but there are as many gems as there are cows in this collection. If you're tired of the same old transitions—and you have an appropriate sense of restraint—you'll find plenty of uses for TransJammer.—JIM HEID

Master CD Pro

Recordable CD-ROM Drive

PROS: Quad-speed, multisession writing; bundled software supports many CD formats; dedicated hard drive not required. **CONS:** No archiving software; user-interface quirk can lead to CD write errors. **COMPANY:** MicroNet Technology (714/453-6000). **LIST PRICE:** $4995.

MW ★★★

MICRONET'S MASTER CD PRO IS A powerful—and pricey—CD-R (compact disc–recordable) drive aimed at professional CD producers. (For more on CD-R technology, see "Desktop CD-ROM Publishing," *Macworld*, March 1995.) The Master CD Pro bundle consists of a Yamaha CDR100 quad-speed drive in a large and rugged MicroNet cabinet, Astarte's Toast CD-ROM Pro software, and one 74-minute recordable CD.

The CDR100 drive is multisession capable and can write a 74-minute CD in about 20 minutes at quad speed. The drive also supports double- and single-speed writes—useful when you're copying from a CD-ROM reader or a slower hard drive. The CDR100 also doubles as a quad-speed CD-ROM reader. It's capable but not exceptional as CD-R drives go: it's expensive, it displays only limited progress information on its front panel, and it doesn't support volume-production features such as multi-unit slaving. The bundled Toast software is what makes this package useful.

Toast supports a wide range of CD formats: Macintosh, ISO 9660, CD-I, CD Plus, XA, video, and audio. An advanced mode lets you perform generic copying—making a bit-for-bit copy of a source CD from a CD-ROM reader, or of a previously created image file. The software performs no data checking for generic copies, so you can copy data in any format.

To write a CD, you first choose an output format and one or more sources of data (Toast supports hard disks, CD-ROM readers, and temporary partitions using free contiguous hard disk space). The software creates the temporary partitions and mounts them so they appear as independent volumes; that way, you don't have to dedicate an entire hard drive to CD image assembly. Before writing a CD, Toast lets you run simulations at various write speeds to verify that all input sources can deliver data adequately. Once you've found a reliable speed, you proceed to live writing, which can't be interrupted without irreparably damaging the output CD. Unfortunately, Toast has a user-interface flaw that can lead you to do just that: after simulating a given speed, Toast does not automatically set the write speed for you—you must do it manually. If you forget, your CD will write at the default quad speed and possibly experience data underflow, resulting in a corrupted disc.

GIBSON

Toast has several other useful features, such as verification, ISO 9660 renaming, alias checking, and hybrid output. It does not, however, include any archiving capability: you must store an entire input source, not individual files or folders.

The Last Word The Master CD Pro bundle is a nice, ready-to-run tool for professional CD production. The lack of archiving software limits its value as a general-purpose device for data backup, but support for multiple formats and hybrid CD construction make it a versatile CD-production workbench.—MEL BECKMAN

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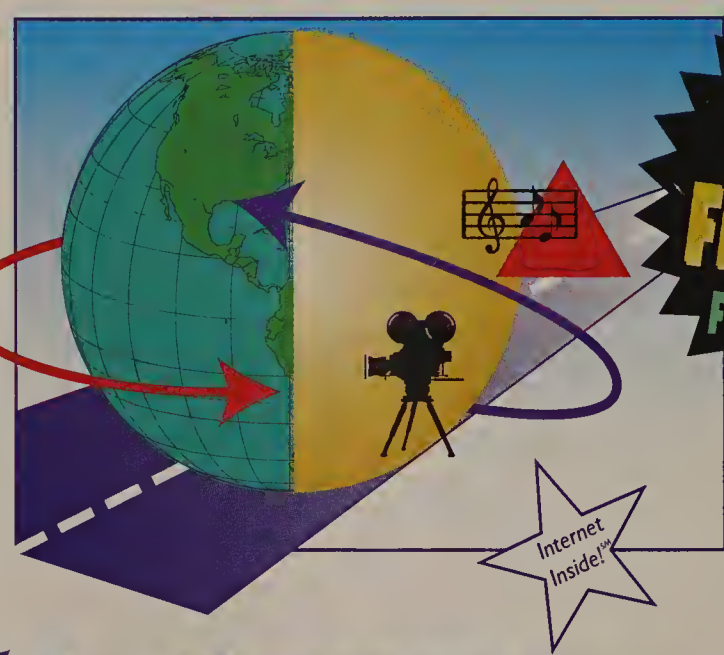

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MacPhase 2.0

Image Processing Software

PROS: Fast; feature-rich; great math-function assortment; Pascal-like macros; nice graphs. **CONS:** Not for beginners. **COMPANY:** The Otter Solution (315/768-3956). **LIST PRICE:** $279.

MW ★★★★

PERHAPS BECAUSE I'M WRITING A book about Microsoft Office 4.2, I've developed an intense affection for programs that, unlike the Office suite, are gratifyingly fast. MacPhase is an outstanding example of this. Not only does it offer every image processing feature you would find in Adobe Photoshop (as well as math tools for constructing filters beyond the wildest dreams of most multimedia artists), but it also makes everything—including complex filters and math transformations—happen at the speed of a mouse-click, with no lag or waiting. Now *that's* positively bracing.

MacPhase 2.0 incorporates two years' worth of requests from technical users. The program's two biggest enhancements, which will be of more value to imaging experts than to beginners, are its macro-programming and data-visualization tools.

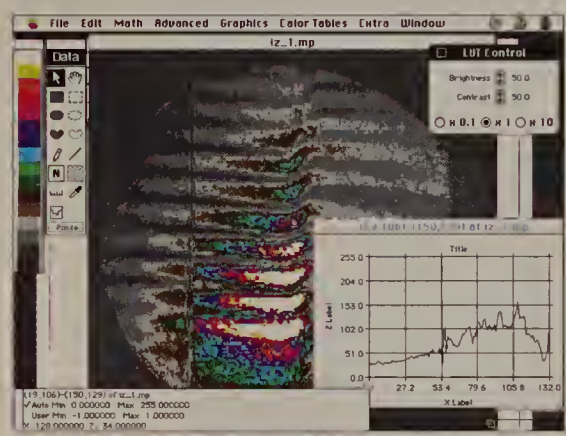
The macro system, a language with Pascal-style syntax, can be approached by writing code or by recording a series of actions. The Record Macro feature is important because it means that you don't have to learn much programming to automate repetitive processing—in fact, you can learn the little you do need simply by inspecting some recorded macros that come with MacPhase.

The data-visualization tools, including a variety of contour and 3-D rendered plots (with associated drawing layers), compete in terms of sophistication with the tools of the significantly more expensive suite from Spyglass (Dicer, Transform, Plot)—at least for modest-size data sets. MacPhase provides some unique features, such as sound annotation of plots (to record your comments). It can also play a 2-D plot as sounds, which helps you pick out subtle points in Fourier-transformed data.

MacPhase add-ons have evolved to provide scores of filters oriented toward graphics, from Alien Skin to Watermark. There are also scientific-interest add-ons, such as convolutions in which an arbitrarily chosen data window is the convolution kernel, and conversion of an image to a numerical spreadsheet. The Otter Solution is currently the vendor for these and other third-party add-ons, which are due to include GPIB, video, and serial-port interfacing by summer 1995.

The only drawback of MacPhase is that tech support is largely confined to E-mail. Since the program is geared to serious users, this shouldn't generally be a problem. Just don't buy expecting lots of hand-holding. Still, if you have a research-quality image processing problem, you have the advantage of extremely knowledgeable support (usually by the programmers themselves).

The Last Word I love this program. It offers the full spectrum of standard scientific and graphics image processing tools, with excellent performance at a modest price.—CHARLES SEITER



Pixelated MacPhase's advanced image processing tools work nearly instantly. Besides a line-slice histogram like this one, you can generate custom filters or Fourier-transformed images.

Phyla 1.0.3

Object-Oriented Database

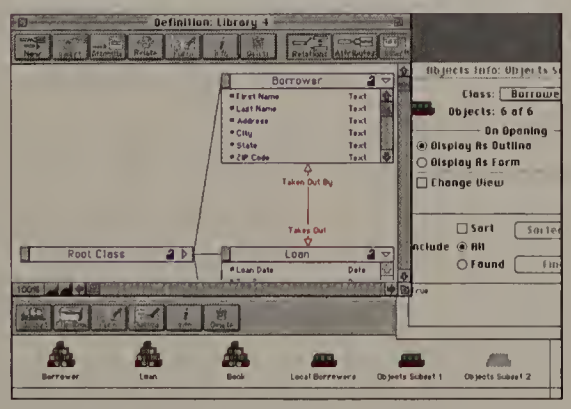
PROS: Logical, efficient object-based design. **CONS:** Object rather than database terminology; documentation skimps on some basic topics. **COMPANY:** Mainstay (805/484-9400). **LIST PRICE:** $495.

MW ★★★

YOUR FIRST FEW DAYS OF USING Phyla will be like entering a new database world. Instead of flat files you have classes of objects; instead of fields you have attributes. As you work through Mainstay's well-designed tutorial and start thinking of invoices, mailing lists, and customer files as objects, you begin to see tenuous similarities to more traditional databases such as Claris FileMaker Pro and ACI US 4th Dimension. Finally, if you're an old Mac database hand, you'll have a shock of recognition—Phyla is like the perennial Mac favorite, Helix Technologies' Helix Express.

Phyla is predicated upon the rise of C++ as the dominant programming language, rather than an imitation of earlier databases. If you hired a C++ programmer to design an invoice system for your business, the program would have class definitions just like those in a Phyla database (see "Containment Policy"). Suppose you create an object called customer that you define by the following attributes: name, address, and phone number. In Phyla, and in C++, modifying the object to add a fax number is trivial. But in Phyla (not so in C++), it's also easy to relate your customer object to other objects such as invoice or credit information—you just draw a relation arrow between the objects and type in the relation definition.

Simplicity of design and ease of modification are big pluses for Phyla, which allows you to build fancy relational databases by dragging objects between windows. Another advantage is speed. Because Phyla continuously updates what other databases call *calculated fields*, reporting is very quick; recalculation is a background activity. On a Quadra 610 (there is no Power Mac version of Phyla yet), Phyla is also faster than market leader FileMaker Pro at nearly every flat-file searching and sorting task. Password protection of whole databases and parts of databases is also clean and intuitive.



Containment Policy Phyla's use of logical, object-oriented building blocks for a database makes sense, but traditional database users must reorient their thinking.

While Phyla doesn't require that you learn a programming language, it wouldn't hurt to have had an introduction to Small-Talk or C++. At least you would have a head start on Phyla-speak, which shares almost nothing with traditional relational-database terminology. Some key topics in practical database usage, such as label printing and paper-report formatting, need more explaining in the documentation.

Phyla can import and export flat data files (used in other database programs), but this product still wouldn't be a first choice for a cross-platform office.

The Last Word While nonprogrammers can use Phyla effectively, it's a more natural database choice for small-office users with some object-oriented programming background. Phyla lacks the large third-party support and consulting environments that have grown up around 4D and FileMaker. But it's fast, and it's a solid implementation of modern object-database practice.—CHARLES SEITER

Before you buy a color printer, you'd better double-check your facts.

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Vivid 3D Pro

Sound-Enhancement System

PROS: Sweeping, enveloping sonic effects; ideal for system sounds and games. **CONS:** Audio CDs may sound harsh or distorted; audible thump when switched on or off; slight background hiss. **COMPANY:** NuReality (714/442-1080). **LIST PRICE:** $149.95.

MW ★★★

STEREO IS AN INEFFICIENT WAY TO deliver a realistic sound image. You have just two channels trying to re-create the three-dimensional sound of a live performance. The Vivid 3D Pro from NuReality is a sound processor that uses the patented SRS (Sonic Retrieval System) technique to restore sonic cues from recordings to produce 3-D sound from two speakers.

The unit has a power-on/off switch at its base and five additional settings on the front panel. One switch turns the SRS processing on or off, and another changes the input source from mono to stereo. The Space slider control adjusts the width of the SRS effect, increasing or shrinking the 3-D soundstage. The Center slider control enhances reproduction in the *presence region*, allowing you to pull the human voice and other midrange sounds into the foreground or push them into the background. A volume control adjusts overall sound level. The unit also features a small built-in amplifier, useful if you use modest speakers that lack their own amplifier.

Hooking up the Vivid 3D Pro takes just minutes. The compact unit installs between your Mac and your loudspeaker system, and all the proper cables are supplied. You just plug everything in and turn it on.

To test the Vivid 3D Pro, I used a Power Mac 8100 equipped with an Apple CD-ROM drive and a set of Bose Acoustimass Multimedia speakers. I used NuReality's own CD sampler disc ($5.95) and some of my favorite games and audio CDs.

On monaural system sounds and games, as well as stereo games, the pseudo–3-D effect was enveloping; I felt immersed in a game's sound effects. Unlike standard stereo, the Vivid 3D Pro doesn't lock you into a specific sweet spot (position for best sound) when you're listening—you get the 3-D effect anywhere in the room.

The SRS sonic effect wasn't as successful with audio CDs. Though the Vivid 3D Pro enlivened dry-sounding recordings by expanding the soundstage, high frequencies sometimes seemed less crisp and clean. And the SRS output could overwhelm rich recordings, distorting the sound. In such

ROBERT PERRY

situations, I reduced the degree of SRS enhancement with the slider controls or turned the feature off entirely.

There are other negatives: turning the power switch on or off produces a highly audible thump, though I observed no damage to my equipment. There is also a slight background hiss at normal volume levels.

The Last Word For system sounds and games, NuReality's Vivid 3D Pro sound processor can work wonders. With audio CDs, the SRS effect doesn't always provide a satisfactory result. For most purposes, though, this unit enhances your Mac's audio capabilities.—GENE STEINBERG

Three by Five 2.0

Writing Tool

PROS: Good brainstorming tool; powerful outliner; useful flash-card feature.
CONS: Needs better Undo; mediocre manual.
COMPANY: MacToolkit (310/395-4242).
COMPANY'S ESTIMATED PRICE: $99.

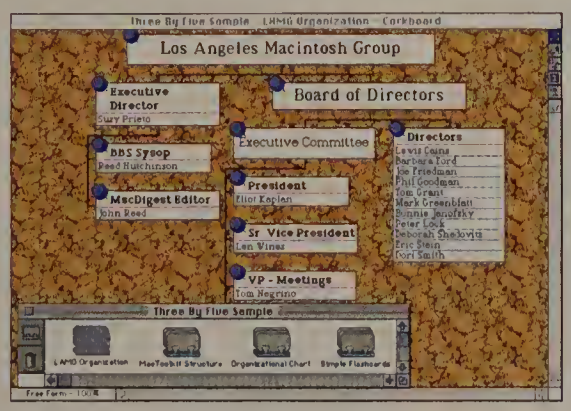
MW ★★★

THREE BY FIVE IS AN IDEA-ORGANIZATION program that uses the metaphor of index cards being moved around on a corkboard. The program also has a full-featured outline view.

The Three by Five document window contains one or more card files. The card files can hold any number of index cards, with each card containing an idea or a picture. You can copy and paste, or drag and drop, cards between card files in the same document or in different document windows. To link cards, you simply drag one card over another. Five types of cards are available: Text Cards; Label Cards, for headers of a column of other cards; Picture Cards, which contain PICT images; Movie Cards, for QuickTime movies; and Custom Cards, a mix of any of the other types. You can assign categories to cards, then search and select cards based on those categories or on any text in the cards.

A unique feature of Three by Five is the ability to create flash cards that you can print or display on screen. Only one side of a card can be displayed at a time; the Flip Card and Shuffle Cards buttons allow you to move easily through the cards. A bar indicator shows the number of cards you've worked through and how many remain.

Three by Five lets you move freely between the corkboard and outline views. You can add or delete topics in either view, and you can select and move noncontiguous topics in both views. As in the outline view, you can show or hide subtopics in the corkboard view by double-clicking on the



Pushpin Organization With Three by Five you can put your ideas on a corkboard and then link them in any order.

topmost card of a group of linked cards.

You can include pictures, or even QuickTime movies, in a Three by Five outline. The Font Override feature lets you change the font, size, and color in your outline, and each level in the outline has a unique style so it's easy to see which topics share the same level of organization. Most outliners use a rigid, linear approach: start at the most important topic and add topics in descending order. Three by Five allows you to develop ideas in its corkboard view, and you don't have to link ideas hierarchically. This process—first brainstorming, then linking the ideas—is closer to the way many people work.

Three by Five, though easy to use, needs refinement. Undo doesn't work for tasks such as moving cards in the corkboard view. The program could use more ⌘-*key* equivalents for oft-repeated chores such as showing and hiding subtopics. There are errors in the manual, and the manual's index leaves much to be desired.

The Last Word Three by Five is a capable program for brainstorming, rearranging, and presenting ideas. Version 2.0 greatly improves outlining and adds import and export capabilities, as well as more card types. Whether you prefer to see your ideas linked graphically or as text in an outline, Three by Five gives you the tools to work effectively.—TOM NEGRINO

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Math Workshop

Multimedia Math Education

PROS: Challenging problem-solving activities; animated characters and puzzles hold children's interest. **CONS:** On-screen help more annoying than useful; some games too conceptual for young children. **COMPANY:** Brøderbund Software (415/382-4700). **COMPANY'S ESTIMATED PRICE:** $40.

MW ★★★★

I NEVER CONSIDERED MATH ONE OF MY favorite subjects, but I'm now revisiting it with my six-year-old daughter. Math Workshop—a multimedia collection of math-related and problem-solving games—offers some innovative ways to help your child learn (while you relearn) mathematical concepts.

You start out in the Control Room, where your guide, an overall-clad teenager named Poly Gonzales, asks you to sign in and click on one of seven activities.

One of our favorite activities, Rhythm Shop, combines music and math by letting you cut, glue, and meld brightly colored fraction bars to fit a melody.

When you solve a math problem—such as adding or multiplying—in Bowling for Numbers, a bowling pin drops or pours into place. You get a certificate of achievement after you get ten strikes.

My daughter also liked Hidden Picture Puzzles, which focuses on geometric and spatial awareness. After you choose one of nine pictures on a TV screen, the TV screen goes blank and colored polygons appear next to it. As you drag them onto the screen, they reveal parts of the picture that are always accurately positioned; this initially misled me into thinking that the pattern pieces were fitting correctly—not necessarily the case. In fact, some of the hardest puzzles were well beyond my daughter's reach.

Super Sticklers involves recognizing segments and shapes. After choosing a drawing on the Sticky Easel, you get a jumble of Sticky Lines that correspond to parts of the drawing. You drag the lines and shapes into place, sort of like tracing a template. You can (and often must) rotate the pieces to find the correct orientation; unfortunately, the help button's proximity to the rotate button results in unexpected and annoying visits from Poly—having her dispense the manual's tricks and tips instead of explaining how to play the game would make more sense.

Puzzle Patterns and Pattern Windows are fun, but the concepts of pattern positioning and relationships seem too complex for young children. The same goes for Rockets, a strategy game in which you must use computational and estimation skills to decide how many rockets to launch each turn so that you're the last one to blast off.

The Last Word Except for a few of the most complex puzzles, Math Workshop's games seem better suited for the 6-to-9-year-old crowd than the suggested 6-to-12 age group. The program did not run on my 40MB Centris 650 with 32-bit addressing on, though it worked fine on a 20MB 610. (Brøderbund was unable to reproduce this problem on either a high-RAM Quadra or a Power Mac.) But once we got it up and running, Daron and I thoroughly enjoyed Math Workshop.—CATHY ABES

Rhythmic Fractions Assemble the correct rhythm bars on the Fractionaire, and the goofy-looking Algebird dances to your tune.

Zonkers 1.0

Desktop-Enhancement Package

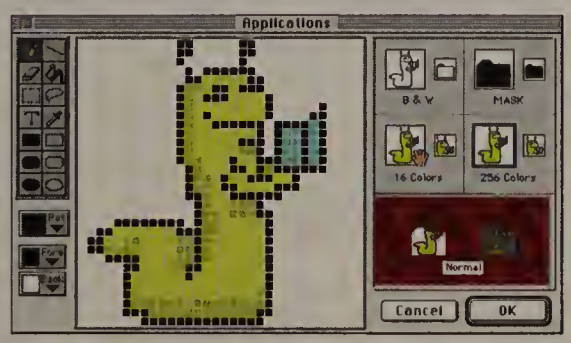
PROS: Good icon editor; easy-to-use interface. **CONS:** Icon package is rather bland. **COMPANY:** Nova Development (818/591-9600). **LIST PRICE:** $19.95.

MW ★★★

EVEN IF YOUR EMPLOYERS WERE gullible enough to spring for a screen saver when you told them it would prolong your monitor's life, you'll never manage to convince them that Zonkers, a collection of Mac enhancements, is an essential part of your business life. Zonkers doesn't even pretend to be practical, businesslike, or prudent. There's only one reason to buy this software package—double-clicking on a rainbow-tie-dyed folder is much more fun than double-clicking on a boring gray one.

Zonkers installs a control panel from which you can modify seven different elements of your desktop. You can change icons, scroll bars, cursors, buttons, menu-bar items, windows, and desktop patterns using the 2000 different enhancements Zonkers provides. (The CD-ROM version of Zonkers comes with 5000 enhancements.) About half are icons Nova Development bought from an existing collection by Component Software.

My reaction to the enhancements was mixed. The folder and file icons are pretty uninspired and unoriginal for my taste, but I like the way Zonkers modifies the other desktop elements. I used the program to change menu-bar titles into animated icons, add color to window scroll bars, and set my desktop pattern to cycle through a random selection of the included Thought I Could's Wallpaper patterns every hour. Within the Zonkers control panel are eight modules that let you configure the seven desktop elements and their display. (The eighth module is a colors module that controls the colors of windows menus, scroll bars, and buttons.) You can also create elements from scratch in some modules. All these enhancements take up about 7MB of disk space, and the control panel adds 83K of RAM to your system software.



The Mighty Banana Slugs I used Zonkers' icon editor to make an icon of my all-time favorite college mascot: UC Santa Cruz's Banana Slug.

Zonkers also installs an optional pull-down menu in the menu bar of your Macintosh, right next to the Apple Guide icon. You can access all of the different modules in the Zonkers control panel from this menu, including the stand-alone icon-editor application.

Launching the icon editor opens a pair of windows where you make all your icon changes. In one window, you select a new icon from one of Zonkers' icon libraries. Simply drag that icon over to the one you want to replace in the first window, and drop it on top. The change is automatic. And if, like me, you find Zonkers' icon selection wanting, you can always use the editor to build your own icon libraries or modify existing icons. The editor is very similar to other icon editors like Dubl-Click Software's Icon Mania. It uses a separate window to change icons pixel by pixel, using basic paint-program tools in black-and-white, 16-color, and 256-color modes.

The Last Word I can't look anyone in the eye and say this is a must-have program. But Zonkers' broad-based approach to customizing your Mac is pretty compelling, especially if you're inclined to make your own icons.—MATTHEW HAWN

Choosy moth

ClarisWorks kicks the kumq

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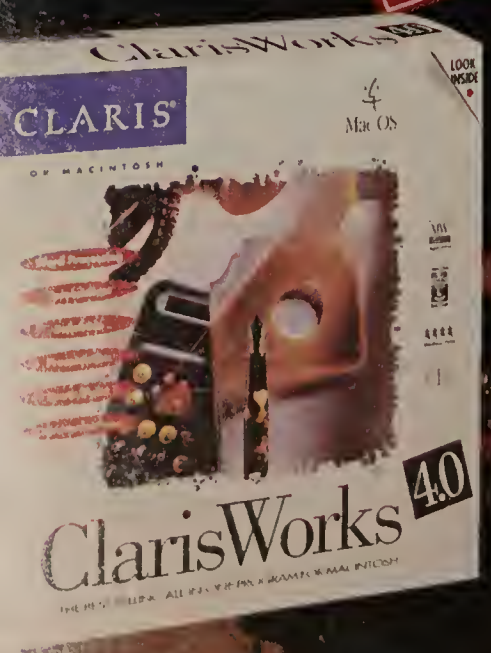

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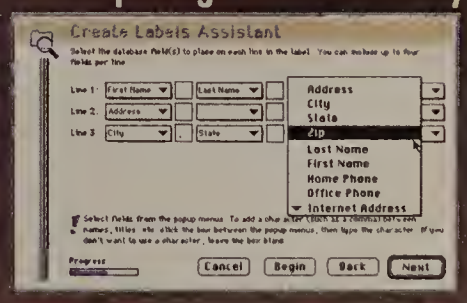

Top: Use the drag-and-drop ReadyArt Libraries to add clip art to any document.
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FIRST OF A **NEW BREED**

Apple breaks with the past to deliver the fastest, most expandable Macintosh ever: the Power Mac 9500

BY **JIM HEID**

THE FIRST OF APPLE'S SECOND-GENER-ation Power Macs has arrived. The new Power Mac 9500 breaks with the past while also borrowing from it. Although it's a second-generation Power Mac, the 9500 brings with it many firsts. It's the first Mac to use the PCI expansion bus instead of the NuBus slots the Mac II introduced back in 1987. It's the first Power Mac to use the second-generation PowerPC 604 CPU. It introduces CPU-upgrade and memory-expansion schemes that are new to the Macintosh world. And it brings a variety of architectural improvements, from an improved 680X0 emulator to a faster SCSI bus, that you can expect to see in future Power Macs.

But like the original Mac II, the 9500 provides a scaled-down set of built-in features. There's no on-board video circuitry; you need to install a PCI-based video card to connect a monitor. Even the five-slot Quadra 950, the most expandable 68040 Mac that Apple ever made, provided on-board video.

The 9500 also lacks AV features—it supports 16-bit, 44kHz stereo audio recording and playback, but it can't digitize video or route its image to a TV set without third-party hardware.

No, the 9500 is all about speed and expansion, not built-in capabilities. Think of it as the most lavish foundation ever built.

The 9500 is initially being offered in two versions: the 120MHz 9500/120 and the 132MHz 9500/132. The 9500/120 costs $4699 and includes a 1GB hard drive and an ATI Technologies mach64 accelerated 24-bit video card. The 9500/132 costs $5399 and includes a 2GB hard drive. Both models include 16MB of RAM and a quadruple-speed CD-ROM drive.

PHOTOGRAPHS BY KEVIN CANDLAND

The new Power Mac 9500 takes advantage of the faster PCI bus. Expect to see faster, cheaper add-on cards, such as video cards from Radius and ATI Technologies.

A 604 to Go

The Power Mac 9500 delivers on Apple's promise to use new PowerPC-family CPUs as they become available from IBM and Motorola. The PowerPC 604 sports internal improvements that make it faster than the 601 used in the first-generation Power Macs, and it runs at faster clock rates—up to 132MHz now, with faster speeds on the horizon. (The fastest 601-based Power Mac, the now-discontinued 8100/110, runs at 110MHz.)

Fastest Mac Yet Macworld Lab's tests confirm the 9500 to be the fastest Mac ever (see the benchmarks in "How Fast Is the Power Mac 9500?"). But is it the fastest personal computer? According to Macworld Lab tests of the latest 120MHz Pentium systems, the answer is, often but not always; see *Power Mac News*, in this issue.

First Replaceable CPU The 9500's 604 CPU lives not on the motherboard itself, but on a 4-by-7-inch card you can unplug and replace. Thus, for $500 to $1000 you can quickly turn a 9500/120 into a 9500/132 when Apple releases its upgrade later this year—and you can take advantage of higher-speed 604 CPUs as they become available. (Apple expects 150MHz 604 chips to be available relatively soon, perhaps by 1996.) Apple is publishing the specifications for its CPU-upgrade slot, so expect to see other companies deliver warp-speed CPU upgrades, some of which might even combine multiple processors.

When you install a CPU-upgrade card, the 9500's internal buses run faster, too, boosting video and memory-access performance and SCSI throughput. (That doesn't happen in a PC's CPU OverDrive upgrade.) For example, in the 9500/120 and 9500/132, the CPU buses run at 40MHz and 44MHz, respectively; when 150MHz 604 chips become available, however, installing one will bump the buses up to 50MHz. (At CPU speeds between 100MHz and 150MHz, the buses run at one-third the CPU's speed. But the buses' upper limit is 50MHz, so don't expect to get 60MHz buses when you pop in a 180MHz 604 someday.)

From SIMMs to DIMMs

In the first-generation Power Macs, you add memory through 72-pin Single In-Line Memory Modules, or SIMMs. SIMMs transfer 32 bits of data at a time; to accommodate the PowerPC 601's 64-bit memory architecture, upgrading RAM means installing SIMMs in pairs.

The 9500 introduces a new memory-expansion board: the 168-pin Dual In-Line Memory Module, or DIMM. DIMMs provide a 64-bit-wide data bus that eliminates the hassle of buying SIMMs in pairs and installing them in physically contiguous slots. If you do

How Fast Is the Power Mac 9500?

= Best result in test.
Results are times as fast as a Centris 650 (Centris 650 = 1.0). Longer bars are better. Products are listed in decreasing order of overall performance.

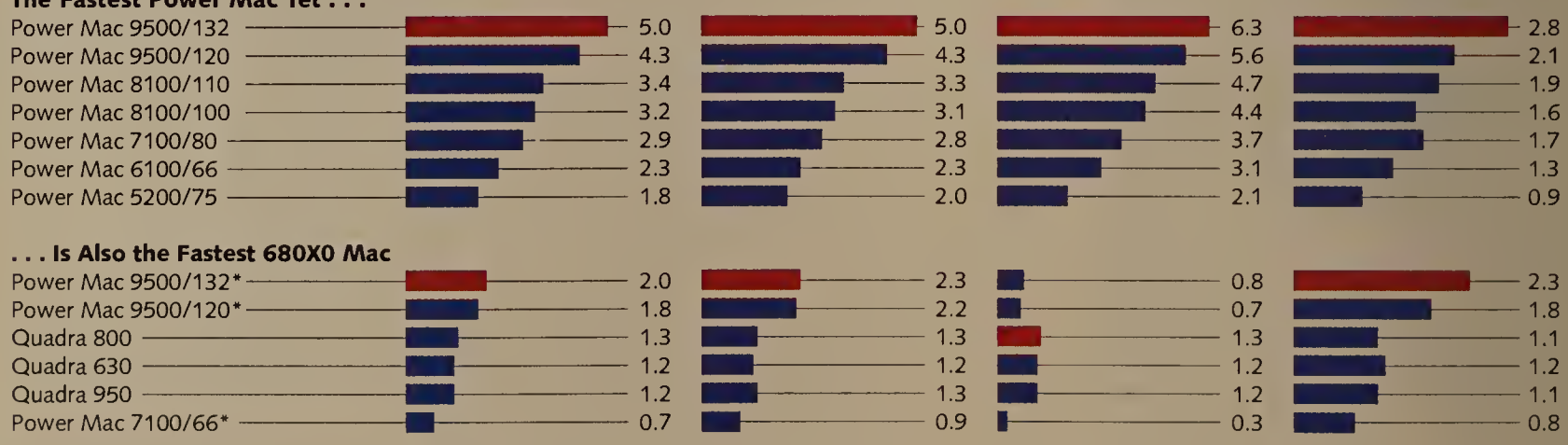
The first Power Mac using the new PowerPC 604 shows the benefit of using this state-of-the-art CPU: raw speed. In all measurements, the prototypes of the 604-based Power Mac 9500 outperformed all other Power Macs. We couldn't gauge how much faster the new PCI bus is compared with the old Power Macs' NuBus since neither Apple nor other developers had PCI cards available to test, although PCI should bring at least a twofold speedup for graphics display. A surprising finding was the 9500's performance in 680X0 emulation—thanks to a faster CPU and a new 680X0 emulator, even in emulation mode the 9500 is faster than any 680X0 Mac ever was, with the key exception of FPU-intensive work common to rendering and analytical computing.

Overall Score
Indicates typical performance in a mixed-use environment, such as a company or school.

CPU-Intensive
Indicates performance for most business and personal tasks.

FPU-Intensive
Indicates performance for analytical, 3-D, and other specialized uses.

Disk-Intensive
Indicates performance of the Mac's data-transfer capability, which affects all users.



Running in 680X0 emulation; Infini-D couldn't run under this mode, so we factored it out of all our 680X0 tests.

BEHIND OUR TESTS

Macworld Lab tested several functions in eight key programs plus the Finder to determine real-world performance for the three critical performance areas faced by most users: The CPU-intensive tasks evaluate the Mac's essential computing performance; the FPU-intensive tasks gauge performance for tasks that take advantage of the floating-point unit; and the disk-intensive tasks gauge the performance you'll get for launching programs, opening and closing files, and copying files.

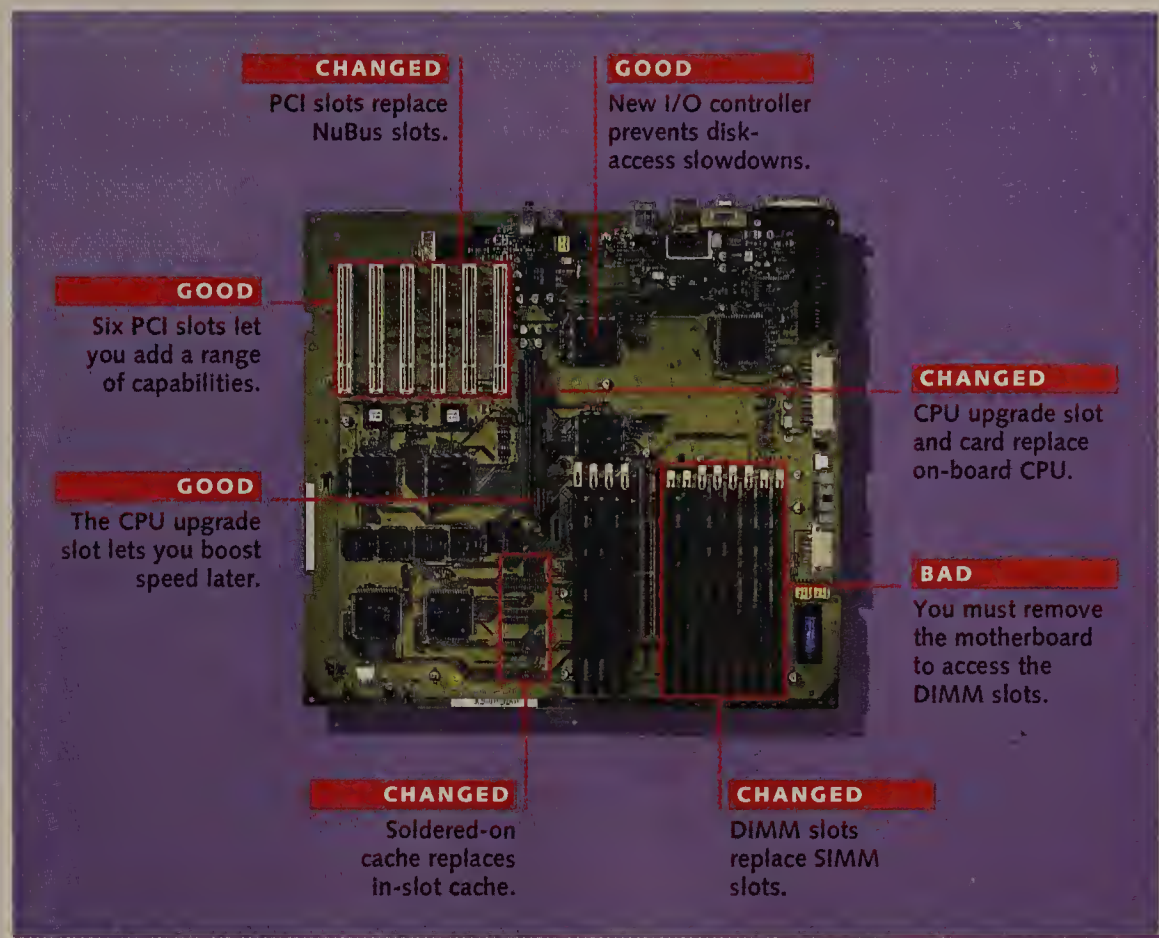
We then averaged the results, giving the CPU-intensive score 60 percent of the weight and the FPU and disk scores 20 percent each, to derive the Overall Score, which gives an accurate measure of the Mac's performance for most business uses. These results are comparable with recent *Macworld* benchmarks. We tested native versions of software on the Power Macs and 680X0 versions on the 040 Macs. The software included System 7.5; Adobe Illustrator 5.5, PageMaker 5.0a, Photoshop 3.0, and Premiere 4.0; Fractal Design Painter 2.0; Microsoft Excel 5.0; Specular International Infini-D 2.6; and Wolfram Research Mathematica 2.3. Our 68040 Macs had 16MB of RAM, while the Power Macs had 24MB. All systems were run with 8-bit color on 17-inch monitors.—**Macworld Lab testing supervised by Mark Hurlow and Danny Lee**

install two identically sized DIMMs, the 9500's memory architecture ties them into a 128-bit memory bank, interleaving access to them and providing, according to Apple, a 10 to 15 percent performance boost. (A similar scheme for some early Quadras boosted performance 5 to 7 percent, according to Macworld Lab tests.)

DIMMs used in the 9500 must have an access speed of at least 70 nanoseconds. The 9500 provides 12 DIMM slots (there's no RAM soldered onto the motherboard) and can support more memory than any Mac yet: up to 768MB with 64MB DIMMs and up to 1.5GB with 128MB DIMMs. Buying 768MB of DIMM-based memory will set you back about $25,000. Newer Technology, which was Apple's DIMM supplier for prototype 9500 models, expects DIMMs to cost roughly 5 to 10 percent more than SIMMs. Newer is developing a DIMM expansion unit that would allow the use of existing 72-pin SIMMs in a 9500.

Installing the DIMMs is similar to installing SIMMs in a Power Mac 8100—unfortunately. The 9500's case design, essentially a stretched version of the 8100's, requires that you remove the motherboard to upgrade memory.

The Power Mac 9500 also introduces a new external-cache memory scheme. Where previous Power Macs contained SIMM slots for cache memory, the 9500 has 512K of cache soldered onto the motherboard. And the cache itself works differently; it provides a 128-bit-wide data path (versus first-generation Power Macs' 64-bit path), and it uses a copy-back rather than write-through scheme. In English: caching is a lot faster than in first-generation Power Macs.



Blueprint for the Next Generation The Power Mac 9500 uses a new motherboard, based on the 8100's design, that incorporates several changes to boost performance and reduce cost.

From NuBus to PCI

With the first-generation Power Macs, Apple often chose compatibility over performance. The first Power Macs' use of NuBus slots was a prime example—faster slots would have yielded faster machines but forced Macintosh users to buy new cards. But for a variety of reasons, the first-generation Power Mac NuBus slots (particularly in the 7100) were often significantly slower than those of the previous powerhouse, the Quadra 840AV.

The 9500 sheds these constraints by adopting the PCI expansion architecture, which is becoming increasingly popular in the PC world and a de facto standard on Pentium-based PCs (see "Why PCI," *Macworld*, June 1995). PCI provides dramatically faster performance than NuBus and makes it far easier for hardware developers to create cards that work in PCs as well as Macs. Apple says that if a developer adheres to the PCI 2.0 specification when designing a card, it will only have to write driver software to make the card work with PCI Power Macs.

That sounds too good to be true, but several major PCI developers I talked to confirmed this was their experience (see the sidebar "Who's Doing PCI: An Update").

By letting users buy expansion cards that work in PCs and Power Macs, PCI makes it easier for businesses to mix platforms. And because PCI cards sell in greater volume, they cost less. For example, an accelerated 24-bit graphics card for NuBus can cost $1000 to $2000. Compare that with the similar mach64 PCI card, which costs about $700 (ATI, 905/882-2600).

To ease the transition from NuBus, Second Wave (512/329-9283) has introduced PCI versions of its NuBus expansion chassis. The $595 Xpanse PN200 contains two NuBus slots and draws its power from the Mac's SCSI connector—clever. The $995 Xpanse PN400 contains four slots, and the $1895 Xpanse PN800 contains eight.

Second-Generation Improvements

The snap-in PowerPC 604, the DIMMs, and the PCI slots are the biggest news in the 9500, but the new Mac also sports a variety of other enhancements, many of which will be standard in future Macs.

Better Networking The 9500 has not only a standard AAUI Ethernet port, but also a 10BaseT connector, eliminating the need for an extra-cost adapter for use on a 10BaseT Ethernet network.

More significant, the 9500 is the first Power Mac to ship with Apple's Open Transport networking architecture. Besides being written in native PowerPC code and providing better performance, Open Transport is a new implementation of the AppleTalk and TCP/IP network protocols designed to support next year's Copland Mac OS release (see *Networks* news, *Macworld*, March 1995).

Improved Input/Output The 9500's internal SCSI bus supports SCSI-2 Fast and, according to Apple, provides sustained data-transfer rates of 6MB to 7MB per second with Apple's 1GB and 2GB hard drives. Other aspects of the 9500's I/O subsystem are also faster, thanks to a new direct memory access (DMA) scheme that minimizes the CPU's involvement in data transfers across the SCSI and PCI buses as well as through the serial and Ethernet ports.

New Emulator Called the Dynamic Recompilation Emulator (DRE), this new OS component runs 680X0 programs faster than did the emulator in the first-generation Power Macs. Where the old emulator translated 680X0 code line by line, the DRE compiles 680X0 programs into native PowerPC code on the fly. Compiled code is stored in a 256K cache; if it's needed again, the DRE retrieves it from the cache instead of recompiling.

Apple claims the new emulator runs 680X0 programs 20 to 30 percent faster

WHO'S DOING PCI: AN UPDATE

In the June 1995 feature "Why PCI," *Macworld* listed numerous developers who had announced support for the PCI Power Macs. These included ATI Technologies, Diamond Multimedia Systems, Genoa Systems, and Matrox for accelerated video cards; EA Research and Radius for graphics accelerators and digital-video adapters; Adaptec and FWB for accelerated SCSI controllers; and 4-Sight, Asanté Technologies, Dayna Communications, Digital Equipment Corporation, Farallon Computing, Fore Systems, and Interphase International for high-speed network interfaces.

The PCI bandwagon is even more crowded now. In addition to the companies above, the following developers have announced PCI products for the Power Mac 9500.

Digital Video Avid Technology, Fast Multimedia, Intelligent Resources Integrated Systems, and Truevision have announced plans to ship PCI-based digital-video cards.

PC Compatibility Orange Micro's Series 400 card contains a 486 processor and can be upgraded to a Pentium, and it can accommodate up to 64MB of RAM. The card supports an optional SoundBlaster-compatible daughtercard that provides two serial ports, one parallel port, one game port, and sound-input and -output jacks. It also improves video performance.

Networking and Communications Spectra Systems, Neutral, DCA, and Rockwell Network Systems have announced high-speed network interface cards. InnoSys is developing a high-speed, four-port serial interface card that will link PCI Power Macs to airline reservation systems. Creative Solutions will ship a PCI card that adds six serial ports.

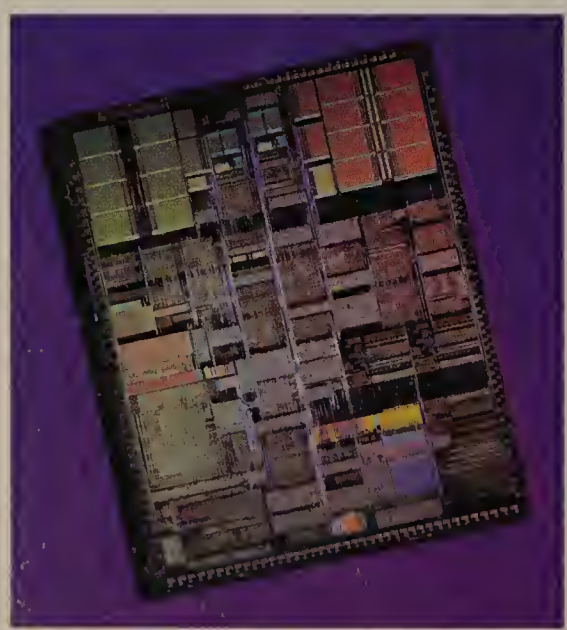
Prepress and Imaging Yarc Systems is developing coprocessing and graphics accelerator cards as well as raster-image processing cards to drive color laser copiers and imagesetters. Electronic Imaging Systems is developing PCI interfaces for high-end drum scanners from Dainippon Screen and Linotype-Hell; the latter company is also delivering a color-space conversion card.

Science and Engineering National Instruments is developing GPIB interface and data-acquisition cards. Precision Digital Images is developing high-resolution digitizing boards for scientific and medical imaging.

Storage Atto Technology, Distributed Processing Technology, MicroNet Technology, and QLogic have developed SCSI-2 adapter cards and disk-array products.

than the old one. By and large, Macworld Lab tests bear this out. However, both 9500 models were significantly slower when emulating 680X0 floating-point code, finishing behind even a Centris 650.

Tweaked System Software The 9500 series uses Mac OS 7.5.2, a new version of the system software that incorporates the System 7.5 Update 1.0 plus some additional enhancements. (Apple has also changed the name from System 7.5 to Mac OS 7.5.) The Resource Manager, a portion of the Mac OS that's used extensively by programs, as well as by the OS itself, was rewritten in native PowerPC code, as was the Ethernet network driver and SCSI Manager. (Macworld Lab tests show that the native SCSI Manager and internal SCSI-2 Fast bus pay off: the 9500/132 was 47 percent faster than an 8100/110 in disk-intensive operations.)



Changing of the Guard While the IBM PowerPC 601 CPU will continue to be used in future Macintoshes, the new 604 (shown here) from IBM and Motorola has taken the role of leading-edge CPU for personal computers.

Mac OS 7.5.2 also contains a new mechanism for native-PowerPC device drivers, which among other things will make possible faster transfers between the Mac and PCI cards. This mechanism, called the Driver Services Library, is one of the first stepping-stones to next year's Copland Mac OS release (see "The New Mac OS Unveiled," *Macworld*, July 1995).

The new system version also does away with the 4GB-disk-partition limitation of System 7.5 by supporting drive volumes of up to 2 *terabytes* (that's 2048GB). Alas, the Mac's file system still limits file sizes to a maximum of 2GB and allocates disk space rather inefficiently on large volumes.

Foundation for Graphics Acceleration Part of the Driver Services Library will make it easier for hardware developers to create accelerated graphics cards. Previously, hardware developers had to devise their own acceleration schemes; now there's a defined structure for graphics acceleration.

The Last Word

The Power Mac 9500 is not the second-generation Power Mac for the rest of us—it's too pricey and comes with too few built-in capabilities. Those who are waiting for a midrange second-generation Power Mac, particularly one with built-in AV features, will have to hold out a while longer. Even if you crave a 9500, you might have to wait—judging by Apple's recent track record, supplies of the 9500, particularly the 132MHz model, may be scarce at first.

But the 9500 is an excellent foundation for a high-end production workstation—for color publishing or media production. Its speed and expandability should also make it popular in the scientific and technical markets. By breaking with the past, by stressing performance over expansion compatibility, and by adding more native system software, the first of the new Power Macs blazes a trail that the mainstream second-generation Power Macs will follow.

And what of the first generation? One of the claims Apple made when it released the original Power Macs was that the machines would become faster as more portions of the Mac OS went native. However, Apple doesn't think it can bring the DRE enhancements to earlier Power Macs because their ROMs would have to be replaced. And Apple hasn't yet decided whether to bring the other system enhancements to the earlier Power Macs. It should. The pioneers who made Apple's transition to RISC a success shouldn't have to wait until next year's Copland OS release to enjoy the benefits of a faster Mac OS. **m**

Contributing editor JIM HEID has been writing about new Macs since November 1983. He's the author/producer of the *Macworld Complete Mac Handbook Plus Interactive CD*, third edition (IDG Books Worldwide, 1994).

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Is Apple Serious

Some would-be clone makers say that

Have the shifting sands at Apple buried a key growth strategy—the use of licensed Macintosh clones to reach new customers—and perhaps foreclosed the promise of a thriving Mac-clone market that would bring lower prices, more innovation, and better product choices?

by Charles Piller

Since last fall Apple has insisted that it supports open licensing of the Macintosh Operating System. Apple then announced that, to ensure the future of the Mac, it would promote a strong clone market that could rapidly grow the Mac OS market share. Apple officials predicted that the clone strategy would lift the Mac market share 3 to 4 percent by mid-1997—meaning millions of Mac clones would have to be sold—and that the company's strong PowerPC push would add another 2 or 3 percent, growing the Mac from its perennial 10 percent market share to 16 percent or so.

Achieving that goal would be a huge accomplishment; Mac sales would have to grow at several times the rate of other personal-computer sales, which are themselves growing quickly. Such meteoric growth, Apple officials hoped, would quell the doubts consistently expressed by market analysts that Apple would ever be more than a niche computer maker.

Yet of the four Mac OS licensees announced in the past six months, only Power Computing—a start-up company—will build mainstream systems. And the 100,000 units that company hopes to sell in the next year would not even register on industry market-share surveys. The other three licensed clone makers—DayStar Digital, Radius, and Pioneer—will all produce specialized systems for niche markets.

As each month passes, Apple loses time to wage its battle to capture hearts and minds before shipment this August of Windows 95—Microsoft's new OS that features many capabilities pioneered by the Mac. Now is the time for Mac clones to battle PCs, yet still no major computer company has announced intentions to produce a Mac clone. Why?

Does the Mac lack appeal for major companies, or is Apple less committed to a clone market than its rhetoric suggests? Some key computer executives in Asia say the problem is Apple, not the Mac. In a series of interviews, these executives tell *Macworld* that Apple has yet to make up its mind about cloning. Key executives in the United States echo these concerns. And in comments to *Macworld*, Apple's top licensing officials indicate that Apple's commitment has been scaled back.

"We have changed the earlier vision statement or charter to grow Mac OS market share," says Apple's new director of OS licensing, Larry Lightman. "[Licensing] will still be a very important aspect of growing market share, but we're not trying to do it on our own. That goal is no longer being pinned as heavily on Mac OS licensing." Instead, he explains, Apple will seek growth by investing in a broad range of efforts and technologies. Lightman says that Apple is no longer publicly estimating the growth of the Mac OS market share. Given scant progress toward its original market-share goals, Apple's change in tone may have been predictable. But what caused the change in the clone charter?

Reading Apple's Tea Leaves

Factional infighting at Apple has greatly delayed its licensing program, according to Chris Hsu, acting director of overseas operations for Taipei, Taiwan–based Tatung (a major supplier of Apple-branded monitors and Packard Bell PCs). Hsu's views are echoed by several other Taiwanese and Japanese executives. Despite that concern, these executives still view Apple's recent reorganization (see "Apple's New Business Model," *At Work* news, in this issue) with cautious optimism. They suggest that Apple's executive vice president, Ian Diery, was forced out in the recent reorganization because he was not sufficiently supportive of licensing, indicating Apple's commitment to licensing.

On the eve of Apple's reorganization, Tsutomu Kobayashi, deputy general manager for corporate R&D at Osaka, Japan–based Sharp, commented that Apple's vice president for licensing, Don Strickland, had been frustrated with a lack of support from higher management; Kobayashi predicted that Strickland would leave unless he got a bigger staff and budget. In the new Apple structure,

about Clones?

Apple's efforts are only halfhearted. A Macworld investigation.

JEFFREY PELO

Strickland has indeed left licensing. He now is vice president of Apple's business and government divisions, although he will continue to have indirect involvement in licensing.

Unlike Diery, Strickland is widely respected as a forceful advocate of licensing, so the net effect of the reorganization—Diery out, Strickland transferred—is far from clear. "Apple's ability to stay focused on a product line is not well demonstrated," says one knowledgeable industry source. "As a case in point, Strickland leaves just as he's getting going [on clones]."

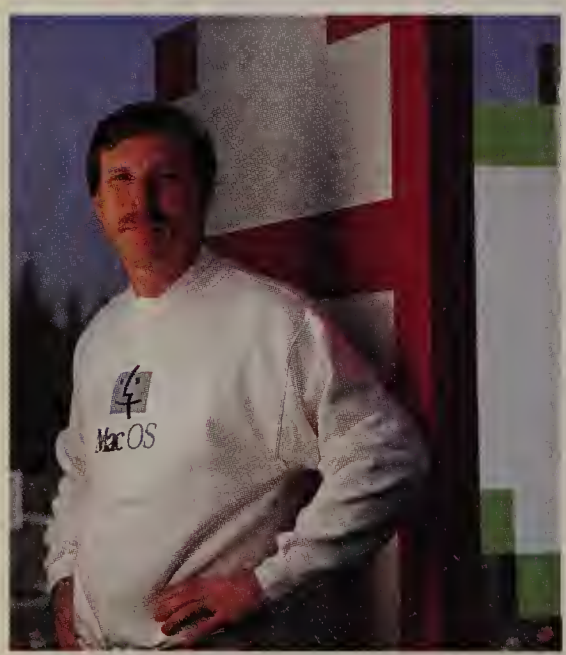
Strickland and Lightman deny that the recent reorganization had anything to do with internal differences over licensing, and senior vice president David Nagel tells *Macworld* that internal debates about licensing "are long since over." Lamar Potts, formerly director of finance at the AppleSoft division, recently replaced Strickland. He and Lightman say that under the new Apple structure, licensing is now closer to the mainstream of the company and that the licensing program will be refined over time.

Elusive Licenses

Whatever refinements Apple deploys, many Japanese and Taiwanese computer makers view the licensing program with

considerable skepticism. They say Apple fears that Asian clone makers would cannibalize key markets, particularly in Japan, where Apple captures some 16 percent of personal-computer sales—the kind of market share Apple says it wants worldwide, with the help of clones.

What evidence do these potential clone makers cite to support their claims? Several Taiwanese companies that have explicitly expressed interest in creating Mac clones have so far been unable to obtain a license. These include Tatung, Datatech Enterprises (DTK), Mitec, First International Computer (FIC, which is



ROBERT HOLMGREN

We just cannot support rampant licensing of the Mac OS

LARRY LIGHTMAN
Director of Mac OS Licensing, Apple

already slated to produce Power Computing's Mac-compatible motherboards), and Umax (a leading imaging company).

Tatung would seem an ideal candidate. At press time, the company plans to release PowerPC 604–based systems using Windows NT in June 1995, despite a threat by Intel to cut off the supply of 80X86 and Pentium chips if Tatung committed to PowerPC. Although the threat was not carried out, says Wen-yen K. Lin, a top Tatung executive, "our opinion [remains] that Intel is too strong."

Lin says her company has a very good relationship with Apple and is keenly interested in creating Mac clones to complement its other PowerPC systems. Even so, Tatung has not been able to agree on licensing terms with Apple.

Apple sent a negotiating team to Taiwan in February, but "the license fee was too high, and the companies working on PowerPC were scared off," Lin says. Asked if Apple is as eager to license as it says, Lin responds this way: "Eagerness is one thing, but pricing is another." Tatung hopes to have resumed licensing negotiations by the time this article appears.

K. J. Chou, regional marketing manager for Motorola Electronics Taiwan (which runs a PowerPC technical-support center jointly with IBM), concurs with Lin. Chou says that other Taiwanese computer makers agree that Apple's licensing fees are prohibitive.

These high fees have caused Frank Huang, chairman of Umax, to seriously doubt Apple's commitment to Mac OS licensing. "I want the [Mac OS] license, but Apple won't offer it," he says. "Apple is afraid that Taiwanese companies will force Apple to cut their prices." Huang says that Apple should give away licenses at first to grow the Mac OS market quickly. "Apple, to survive, has to be an open company," he urges. "Taiwanese companies will work hard for Apple."

Apple's Strickland flatly denies that Apple's licensing fees are too high: "We're trying to expand the platform share, and you can't do that with onerous licensing terms."

In defense of Apple's efforts, Nagel tells *Macworld* that Apple has licensed the Mac OS to "at least two other companies." He declines to name the companies, where they are located, their size, or when they would announce products, but says that "they are certainly names you have heard of, significant names in the computer world." Nagel also points out that Apple predicted last fall that the first Mac clones would come to market in the second half of 1995, and that Power Computing began shipping its machines in May, ahead of the predicted schedule.

Licensing Staff Too Small?

Some companies view the protracted negotiations that successful licensees have endured as a sign that Apple's efforts to generate a clone market are halfhearted. Pioneer needed more than five months to negotiate its license for a machine to be sold into the Japanese audiophile market, which Pioneer itself describes as tiny.

Part of the problem, says Juni-ichi Shibata, chief product planner for Pioneer's computer division, was getting Apple to translate and respond to contract proposals—suggesting that Apple's licensing staff, which numbers about 20 engineering, technical support, sales, and marketing people (plus a smaller number of others borrowed from other Apple divisions), is not large enough to cope with a rapidly expanding clone market.

Apple licensing director Lightman says that Pioneer, a newcomer to computer design and manufacturing, wanted to go slow to ensure that it set achievable goals. Still, a long negotiating process is likely to be the norm, he acknowledges.

"Given that these companies [would be] given access to the crown jewels, there are many patent and intellectual-property issues to iron out," Lightman says. Apple will operate more quickly as it gains experience, "but we pretty much understand that we just cannot support rampant licensing of the Mac OS."

Chi-Yuan Liu, a top manager at the Computer and Communications Research Laboratory (CCL) in Taiwan, a quasi-governmental R&D lab with close ties to the country's major computer makers, points out how this slow start is hindering the efforts of potential clone makers: Apple has not yet developed a model for sharing information on the Mac hardware design—necessary for any clone maker who wants to innovate, even in relatively minor ways.

Apple officials say that their licensing team is well supported within the company. "We have run into a learning-curve issue," admits Strickland. But he insists that licensing does not lack for budget or staff. "When Apple built the Macintosh and designed the Macintosh business it was not with licensing in mind," Lightman says. To restructure for licensing "is a very difficult proposition, and one that may have been underestimated."

Lightman says that Apple is placing a high priority on supporting the first licensees to dispel any skepticism about its ability to support larger companies down the line. He says that Apple's licensing infrastructure and documentation will be fully in place by midsummer. "We're getting to the point now where we are stronger and you will see bigger and more important licensing agreements."

Yet to support even a single major clone maker, says Sharp's Kobayashi, Apple would need a far bigger team than it has so far assembled. Power Computing's experience is instructive on this point. CEO Steve Kahng says that Apple has bent over backwards to support his company, dedicating several technical, legal, and marketing people—amounting to a large portion of its licensing staff—full-time. Kahng agrees that the needs of a large company would vastly outstrip

those of Power Computing, in part because Power Computing hired key Apple engineers to work on its system designs, which reduced dependence on Apple.

Taiwanese companies offer a way for Apple to support more clone makers without a dramatic increase in licensing staff or a fundamental change in its approach. Steven Cheng, vice president and general director of CCL, says Taiwanese companies would place a high priority on Asian markets—an area Strickland sees as critical to clone sales—and put a plan into place that would ease Apple's support burden.

That plan is based on the combined efforts of CCL and the Taipei New PC Consortium (TNPC), an organization that includes all major Taiwanese computer companies (including the five noted earlier) except Acer. TNPC was formed to develop PowerPC-based devices. CCL's nearly 1000 employees help develop new technologies for TNPC members.

The relationship between IBM, Motorola, and CCL is very close. CCL licenses technology from IBM and Motorola, then adapts this technology for the specific needs of TNPC members. In part due to CCL's help, TNPC members will soon release computers based on IBM's PowerPC Reference Platform (PReP) standard, CCL's Liu says.

And a TNPC member, United Microelectronics Corporation (UMC), will soon release the first clone PowerPC chip set to compete with chip sets produced by the IBM/Motorola/Apple team, according to Liu. (The chip set controls several motherboard components and the PowerPC chip itself, which the companies would still get from IBM and Motorola.) Liu argues that a relationship modeled after the CCL/IBM/Motorola one could support Taiwanese Mac-clone makers in ways that Apple lacks the resources to accomplish.

Fear of Competition?

"For almost one and one-half years Apple has been in a soul-searching mode about how to turn licensing statements into actions," says CCL's Cheng. "The communication channels [between Apple and TNPC] are wide open and there is goodwill, [but] Apple must develop an internal corporate consensus on how to deal with Taiwanese companies."

Fears of cannibalization have caused Apple to keep TNPC companies at arm's length, according to CCL's director of computer system technology, Chi-Yuan Chin.

Sharp's Kobayashi also believes Apple remains reticent about licensing due to fears of cannibalization. "The Japanese companies would build thinner, lighter PowerBooks with better LCD displays and longer battery life," he says, and could grab a huge part of the notebook and subnotebook market from Apple's lucrative PowerBook line. Kobayashi would not discuss his company's views about the Mac OS but says that "Sony is very interested. Apple could have licensed to Sony three years ago," but Sony hasn't been able to get Apple to come to terms. Sony declines to comment.

AP/WIDE WORLD PHOTOS

I want the [Macintosh OS] license, but Apple won't offer it

FRANK HUANG
Chairman, Umax

Taiwan's CCL is collectively bargaining with Apple for TNPC members, although in nearly all cases, each company would separately license with Apple once a general agreement is reached. Liu says that negotiations have been slow, in part because Apple may fear the consolidated competitive strength of TNPC members and would prefer to license selected Taiwanese companies.

"Apple views Taiwanese companies with suspicion," says Umax's Huang. But Taiwanese companies could quickly build up the Mac-clone market because they are risk takers, have aggressive corporate cultures, and have the manufacturing flexibility and capacity to do the job fast, he argues, predicting that TNPC could grow the Mac OS market share by as much as 10 percent—doubling Apple's market share—within a couple of years.

Apple sees Asian companies as critical to the clone market—although perhaps not in the short run, Lightman says. "We definitely have not crossed TNPC off our list. If we are interested in having mass-produced clones available to everyone, that might be a good way to go. [But] there's a difference between having a glut of Mac clones on the market and having a [clone maker] that's committed to [generating] demand in the business and government markets, for example. We have to look at companies that will make those kinds of commitments, rather than companies that will merely commoditize the Mac marketplace."

Stifling Innovation

The small size of Apple's licensing staff suggests to some companies that Apple is trying to keep others from adding fundamental innovations to the Mac. "Look at Apple's licensing resources," says a knowledgeable industry source. "To put the Mac OS sticker on your product, you need Apple's approval. If you change things, they may not certify it." Thus, Apple may be effectively restricting most clones to straightforward repackaging or minor modifications of Apple's Macs. The first Mac clones—whether from Pioneer, Power Computing, or Radius—all are evidence of this.

An apparent exception is DayStar, which anticipates easy certification for its more innovative Genesis MP multiprocessor clone. But because DayStar is developing the new technology for Apple, it's easy to argue that even DayStar's clones won't stray beyond Apple-authorized innovations. In fact, the underlying technology will be available to all Mac licensees, and Lightman says it does not involve changes to the Mac OS.

Another knowledgeable industry source says that contrary to Apple's long-stated claims that it is looking for licensees with sizable research and development budgets who will innovate on the Mac design, Apple's licenses are actually structured to inhibit innovation. "By definition, if you can't change anything, you're second to market with a given piece of technology, whatever it is. You're licensing something that Apple is already preparing for market."

Lightman acknowledges that Apple cannot support significant innovation by clone makers at this time, due to the tight integration of the Mac's OS and its hardware: Many meaningful hardware changes would require potentially costly and difficult changes to the Mac ROM or

OS—something Apple is not ready to support at this time, Lightman admits.

Apple is also stifling innovation to keep certification and testing costs down. "As we allow licensees to differentiate against our board design, we lose the ability to test against a standard Macintosh," Lightman says.

Wait for the Converged Platform

All this, of course, will change after the converged hardware reference platform (CHRP) specification—a new PowerPC-based computer design under joint development by IBM, Apple, and Motorola and based on IBM's PReP—becomes available (see "Mac Hybrids," *Macworld*, April 1995). CHRP and Copland (the next-generation Mac OS, due by 1997), will divorce the Mac OS from hardware, making it possible to build generic systems that would run the Mac OS as well as most other major operating systems other than Windows 95 or Windows 3.1. Parts for Mac clones would then be cheaper and more accessible (see the sidebar "Can Apple Meet Demand?"). And Copland will support technical innovation by clone makers. But these major technology changes will not occur before 1997.

Accordingly, even Apple's Strickland does not sound hopeful that a big company will find the current Apple licensing approach acceptable. "A major licensee in the top five computer companies [would need], by and large, industry-standard components so that they can leverage their manufacturing base," he tells *Macworld*. "They need design flexibility relative to Apple, to go after the markets they want and to become full-fledged competitors against Apple."

The recently announced PCI-based Power Mac (see "First of a New Breed," in this issue) represents the first Mac design that begins to approach that "industry-standard" benchmark, Strickland adds. But when you can't differentiate at the motherboard level, the proposition of a Mac clone becomes far less attractive to a large computer maker. That's why most—if not all—of the biggest companies will hold off until after CHRP is in place.

"Before 1997, when you start with a derivative of an Apple design, you're not going to put all the R&D and marketing dollars behind it. You're going to wait for the [CHRP]," Strickland says. "Without the [CHRP], licensing would be a niche business."

Is It Too Early to Clone?

The question is fundamental: Can Apple land a big company before CHRP? "It's absolutely true that we have to have at least a couple of licensees in the top 20 computer makers worldwide" before CHRP, Strickland acknowledges. "And you have to have licensees that are not just in niche markets, but they need to be broadly based in areas where [system] sales are growing fast," such as the business market and countries like China.

After CHRP frees Apple from the heavy demands of supporting clone makers, the company could theoretically peddle licenses from a booth at Tokyo's famed Akihabara district—a vast farmer's market of computers. In the long run, CHRP will ensure the economies of scale that major vendors need to justify large-scale competition in the Mac market.

Tatung is a case in point. Tatung's Lin says she would like to offer the Mac clones before CHRP if her company could achieve high volumes quickly. But ultimately, Tatung needs CHRP to be able to create a single basic design that runs OS/2, Solaris, and the Mac OS. "Otherwise we'd have a difficult choice between the IBM platform and the Apple platform," Lin says.

Although crucial in the long run, CHRP may be dampening the enthusiasm of potential clone makers right now. "A company has to ask itself, 'Is it worth the very, very difficult channel and manufacturing problems to get into a straight [Mac] clone market when a year and a half from now a much more appealing market will exist?' " says Glen Miranker, vice president for hardware engineering at FirePower Systems, a PReP developer that has already committed to producing CHRP-based systems. Sales volumes would have to be very high to entice a large company.

Apple's Nagel argues that a low-end clone market based on current Mac designs may survive well into the CHRP era. And some companies might reason that a push into the Mac clone market now would offer a strong competitive edge against Mac OS vendors in the post-CHRP environment. Of course, that strategy implies confidence that Apple will port Copland to CHRP on schedule.

"Apple is hopelessly and chronically late on its software," says one knowledgeable industry source. "If you're a big company looking for a strategic product, you have to wonder if Apple can deliver on CHRP and on Copland in the 1996/97 time frame. Should you rush headlong into making clones for a year's extra experience when you're not 100 percent sure the product you're really after—the CHRP-based Mac—will be around?"

Looking for Big Players

Given the interest that many computer makers have shown in Mac clones, it's clear that some *are* willing to enter the market early and gamble on Apple's promises. Apple is in turn focusing on those that it thinks will grow the market the most, Apple's Lightman says. "Anyone we would look at for a hardware license will have to be capable of moving the market-share needle," he says. Companies that could sell only in the tens of thousands or even the low hundreds of thousands of units "probably would not qualify," unless they had a credible strategy for breaking into new markets.

Smaller companies would be encouraged to create products based on Power Computing's design (which Power Computing is actively looking to license) and to license merely the Mac OS from Apple, reducing Apple's support obligations. Power Computing's Kahng predicts that he will license at least three companies in different parts of the world—"all household names in their areas"—by August.

For now, the Asian computer giants Fujitsu, NEC, and Acer (a major manufacturer of Apple-branded Macs) can be ruled out. Executives at all three compa-

AP/WIDE WORLD PHOTOS

With the right terms, Sony would have had a license years ago

TSUTOMU KOBAYASHI
Deputy General Manager for Corporate R&D, Sharp Corporation

nies tell *Macworld* that their companies will not produce Mac clones any time in the foreseeable future. (Acer may build a PowerPC-based game machine using Apple's Pippin technology, however.)

Likewise, major European computer makers—including Groupe Bull/Zenith Data Systems in France, Vobis in Germany, and Olivetti in Italy—are not ready to create Mac clones, although Vobis has stated its intention to license the Mac OS after CHRP. Olivetti, as the largest investor in Power Computing, holds an option to use and distribute Power Computing technology but has not yet committed to doing so.

That leaves a few likely prospects:

Canon A leading producer of Macintosh printers and a key Apple distributor in Japan, Canon will have released its first (non-Mac) PowerPC computers by the time this article appears.

IBM Big Blue has everything a successful PC maker needs to deliver a credible alternative to the Intel/Windows standard—except a mass-market operating system. It too has non-Mac PowerPC systems ready for release this summer.

Toshiba Already a PowerPC developer, and boasting deep pockets and topflight engineering, Toshiba is a worldwide force in peripherals and laptops.

Sharp This major consumer-electronics, computer-peripheral, and PDA maker also enjoys considerable computer know-how.

Sony As a consumer-electronics powerhouse, Sony has a vast network of dealers and customers and could make a killing on low-end Mac clones. It also has inside Mac experience, as the designer and manufacturer of the PowerBook 100.

TNPC Notwithstanding Lightman's concerns about the Mac market becoming commoditized, the Taiwanese consortium offers the desire, PowerPC expertise, and manufacturing prowess to rapidly grow the clone market.

Time Is Running Out

If no major clone makers are announced until after the end of this year, says Umax's Huang, Taiwanese companies will doubt Apple's sincerity about licensing altogether. Sincerity aside, Apple faces a very practical time limit after which pre-CHRP clones won't make much business sense to many companies. And time is running out.

"I don't discount the possibility of our doing a Mac clone, but the more time that goes by, the less attractive that option becomes," says a top executive at a large U.S. computer company. "Frankly, even if we were going to make a decision today to make a Mac clone, we wouldn't have a product until the end of the year, and that's getting perilously close to CHRP."

When TNPC members ship PReP-based systems that cannot run the Mac OS, PReP "will be their first priority," says Cheng. If no Taiwanese companies show pre-CHRP Mac clones at the fall Comdex trade show in mid-November, don't expect clones from these companies before 1997, when the CHRP platform is completed, he warns.

Clearly, some large companies are content to bide their time and clone the Mac after CHRP. But can Apple itself afford to run a leisurely licensing operation during this bridge period? Windows 95 and Intel's new P6 processor are breathing down Apple's neck. But right now, Windows 95 is late and expected to be extremely buggy, presenting Apple with an important—although transitory—opportunity to solidify its hold on the technological high ground.

Just as important, the Mac OS is the only mainstream OS slated to be ported to CHRP. But Windows NT, which will be ported to CHRP long before the Mac OS, should get a Windows 95–like facelift by late 1996, making it a more serious mass-market competitor. "I'd be very happy to compete [against] NT on the PowerPC on the desktop level," says Apple's Nagel, because the Mac OS will have a huge lead in software applications.

Perhaps more important in the long term, Microsoft's next OS (code-named Cairo), promised by early 1998, will combine Windows 95 and Windows NT within a single *microkernel*-based system—a design that keeps core OS services independent of hardware. Microsoft could then confront Apple with a mainstream competitor that runs on CHRP machines. Such competition could prove deadly to the Mac OS if it hasn't made serious market-share gains by then.

"Apple really has to speed up the clone business, otherwise they have no chance" versus PCs, says Umax's Huang. Apple simply can't effectively do the job of three companies—full-service hardware, software, and research and development—he argues. It needs clone makers to take over some of the burden, so Apple can refocus its own efforts on competitive system software and innovative technology. Huang and others say that a serious Mac-clone market today would stimulate potential CHRP-based manufacturers to choose the Mac OS.

So if Apple waits much longer, don't look for any big companies to announce Mac clones until at least January 1997. Of course, by then the biggest companies might ask whether the window of opportunity has closed. They'll wonder whether Apple plus a small Mac-clone market equals a credible competitor in the OS wars. And they'd have good reason to wonder. **m**

Macworld senior editor CHARLES PILLER reports on Macintosh clones and the impact of technology on public affairs and public policy.

CAN APPLE MEET DEMAND?

While Apple insists that it is wholeheartedly behind its licensing program, the company acknowledges that serious demand-forecasting miscalculations have resulted in parts shortages that have delayed the release of announced clones. These shortages might also affect the timing of other companies who are considering making a Mac clone. The difficulties were severe enough that to ship some of its Radius 100 image-editing Macs as soon as possible, Radius resorted to buying Mac motherboards and other parts from outside sources, including dealers.

Perhaps the most vexing shortage may be of PowerPC CPUs. Motorola admits that the PowerPC 604 needed for top-of-the-line Power Macs (such as the new 9500) is in short supply. There has also been a shortage of 100MHz and 110MHz PowerPC 601s, and sources inside several clone-making companies report difficulty in competing with Apple for those chips. A source close to one clone vendor also says that certain Apple-proprietary, Mac-specific connectors are in short supply.

Several clone vendors now say that the situation is improving, however. In the short term, Apple has actually allocated some of its share of components to licensees, reducing Apple's ability to ship its own systems, according to Don Strickland, vice president of Apple's business and government divisions. Several sources close to clone vendors say that some of the shortages were a simple matter of waiting three to four months for suppliers to increase output.

However, some shortages of common parts such as DRAM, SRAM, and certain capacitors and resistors are affecting the entire personal computer industry and are expected to continue because of intense demand.—**Tom Moran and Charles Piller**

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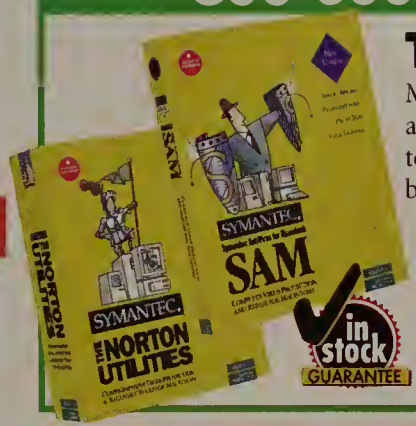

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Multimedia Secrets

MACWORLD'S EXPERT GUIDE TO GETTING THE MOST OUT OF YOUR AV MAC

by Jim Heid

Apple's AV Macs—the Power Mac AV models as well as the discontinued Centris/Quadra 660AV and Quadra 840AV—are ideal foundations for multimedia production. An AV Mac can record and play audio with fidelity so close to that of a compact disc that only golden ears can tell the difference. An AV Mac can also digitize QuickTime movies from a camcorder or videocassette deck, although it needs some additional hardware in order to record and play full-screen video at the 30- frames-per-second (fps) rate you see on TV. And a few mouse-clicks send an AV Mac's screen image to a television or a video recorder.

Before you start producing audio and video using your AV Mac, there is a lot to know about using the Mac as a multimedia studio. I'll cover three AV tasks with advice on connecting the equipment, tips on techniques, and ideas for using the many third-party hardware and software products that can enhance the AV Mac's capabilities.

Whether you're working at an amateur or a professional level, taking full advantage of an AV Mac's features requires a fast hard drive whose driver software supports Apple's SCSI Manager 4.3. Apple's internal hard drives do, as do virtually all drivers supplied with third-party drives or sold separately. Macworld Lab tested nine driver packages and found that two provide better-than-average performance for AV applications. Our findings appear in "Optimizing AV Storage Performance."

Audio Recording and Playback

An AV Mac can record and play 48kHz, 16-bit sound; for that matter, so can all Power Macs (AV and non-AV) except for the 5200/75 LC. Although these specifications exceed those of audio compact discs and match those of digital audiotape (DAT) recorders, audio gurus tell me that the amplification and sound-generating audio circuitry in AV and Power Macs doesn't match the caliber found in professional audio gear. (Apple won't comment on this.) As a result, sound pros will probably need additional hardware.

GEOFF SPEAR

Still, a stock AV or Power Mac can be adequate for producing CD-ROM sound tracks, which typically use 22kHz, 8-bit sound. Musicians making demo or rehearsal recordings will also be content with a stock machine, as will producers making corporate-training or sales audiotapes. Many small radio stations can also use stock machines.

Several AV- and Power Mac–compatible audio programs are available. OSC's Deck II 2.2 ($399, 415/252-0460) and Opcode Systems' DigiTrax 1.2 ($199.95, 415/856-3333) turn an AV or Power Mac into a multitrack recording deck, complete with on-screen mixers and volume-level controls (see the screen images "Multitrack Audio 1" and "Multitrack Audio 2"). Both let you add sound tracks to QuickTime movies. Deck II is the better program for high-end work: besides supporting more tracks than DigiTrax, it has more of the features pros need, including support for high-end digital audio boards. But DigiTrax is cleaner and more straightforward than Deck II; I recommend it to audio amateurs who don't need Deck II's laundry list of features. (Deck II is reviewed in *Macworld*'s June 1994 issue; DigiTrax, in March 1995.)

Multitrack Audio 1 OSC's Deck II is the best multitrack recording program for AV and Power Macs. From upper left: the Mixer, for adjusting record and playback levels; Tracks, for cutting and pasting portions of tracks; the Movie window, for viewing the QuickTime movie whose sound track you're working with; and Transport, with tape-deck–like buttons for recording, playing, and rewinding.

Feeling the heat from programs such as Deck II and DigiTrax, Digidesign has introduced its own software-only recording package, called Session Software 2.0 ($395, 415/688-0600). The program can record two tracks simultaneously and play back up to 16. Like Deck II and DigiTrax, Session Software lets you work with QuickTime movie sound tracks. Unlike its competitors, however, Session Software also supports plug-in software modules developed for Digidesign's high-end recording tools. Session Software does not run on the Quadra 660AV or the stock Quadra 840AV, but you can use it on the 840AV if you have Digidesign's Audiomedia II card installed.

If you don't need multitrack overdubbing capabilities, you should consider Macromedia's SoundEdit 16 ($379, 415/252-2000). SoundEdit 16 also supports all popular Mac and Windows sound-file formats; it's ideal for moving audio between programs and platforms (see *Reviews*, December 1994). And like Deck II and DigiTrax, SoundEdit 16 lets you edit QuickTime movie sound tracks to add music and sound effects or tweak existing sound tracks to improve their sound quality.

If you're a musician who uses Musical Instrument Digital Interface (MIDI) instruments, there's Opcode System's $995 Studio Vision Pro or Steinberg North America's Cubase Audio 3.0 ($799, 818/993-4091), two programs that combine the MIDI and digital-audio worlds: you can use their sequencing features to record and play MIDI tracks, and then add vocal or acoustic-instrument tracks. Mark of the Unicorn's Digital Performer ($895, 617/576-2760) provides similar features, but requires third-party audio hardware, such as Digidesign's Audiomedia II ($1295). Digital Performer currently doesn't work with the audio digitizer built into the Power Mac or AV Macs. Another alternative is to combine Deck II with OSC's $225 Metro MIDI sequencer program, although you may find it more convenient to do all your recording within one program.

Making Connections Connect the audio outputs from your sound source to the Mac's microphone jack. (See the informational graphic "Digitizing Audio" for details on connecting your gear to the Mac's miniplug jack.)

If you have a sound mixer connected to an amplifier and speakers, consider connecting the Mac's sound-output jack to the mixer's stereo return inputs. This will enable you to use the mixer to monitor not only your original sound sources, but also the recordings you make. (If you need a mixer, check out the Mackie Designs [206/487-4333] MicroSeries 1202 [$399] or the larger CR-1604 [$1099]. Both are popular among multimedia producers; I use a MicroSeries 1202 and am impressed with its versatility and sound quality.)

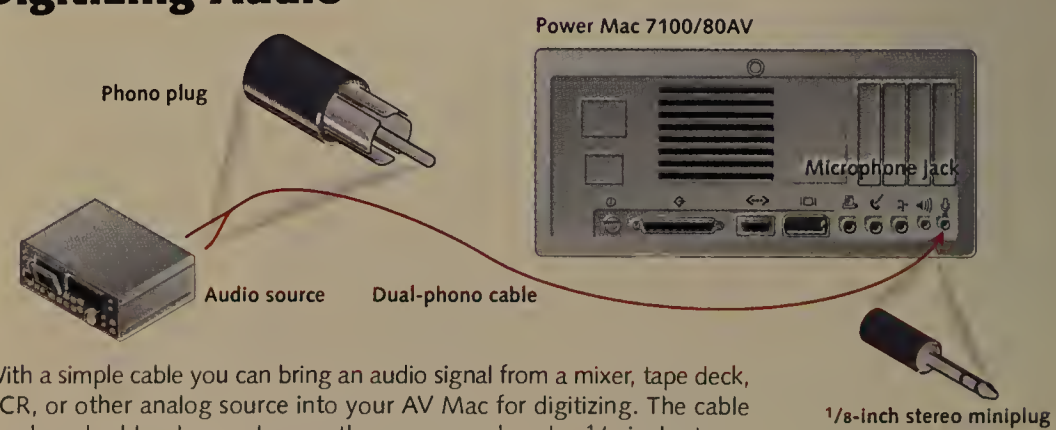
Depending on your hardware setup and needs, you may want the sound you're recording to play through your Mac's sound-output jack so that you can listen to the audio through headphones or external speakers. To activate this play-through mode, open the Sound control panel, select the Sound In item from the pop-up menu, click on Options, and then check the Playthrough box.

Top Techniques Setting record levels properly is a vital first step. To avoid a noisy recording, adjust your program's levels so that the sound signal registers as high as possible on the program's volume meters without hitting the very top meter segment. (If the volume reaches the top segment, the recording will be distorted, or, in digital-audio parlance, clipped.)

If you're using a Power Mac and Deck II, use the Audio Input Level menu (in the Options menu) to specify a level of 0. Power Macs have a low-quality audio preamplifier that can introduce noise; setting this level to 0 turns off the preamplifier.

If you're doing your audio recording with Adobe Premiere's Audio Capture command, adjust volume levels with the Sound Settings command. And if you're

Digitizing Audio



With a simple cable you can bring an audio signal from a mixer, tape deck, VCR, or other analog source into your AV Mac for digitizing. The cable needs a double phono plug on the source end and a 1/8-inch stereo miniplug for the Mac's microphone jack on the other. (Radio Shack catalog number 42-2475 does the trick.)

recording audio while also recording video—using Premiere's Movie Capture command, for example, or the Fusion Recorder application that comes with AV Macs—use the standard QuickTime Sound Settings dialog box.

If you can spare the hard disk space, always record sound using 44kHz, 16-bit settings. Even if you're recording sound destined for a CD-ROM, you'll get better sound quality by recording at 44/16 and then downsampling the audio to 22kHz and 8 bits. Unfortunately, even downsampling adversely impacts sound quality, though to a lesser degree than recording at 22kHz and 8 bits to begin with. Quiet parts of a recording—the pauses between sentences, for example—develop static-like artifacts. This is one reason it's important to record at as high a level as you can. You can also make these artifacts less apparent by combining narration with a music sound track.

Deck II, DigiTrax, and SoundEdit 16 can downsample. Deck II 2.2 does the best job of it; its Mix to Disk command lets you choose from a variety of downsampling options. (For best results, use either the Rounding or the Dithering options—each modifies the audio in ways that minimize the distortion inherent in 8-bit audio.) Adobe Premiere 4.0.1 also has an effective downsampling filter. To apply it, select an audio track in the Construction window, choose Filters from the Clip window, and double-click on the Downsample filter.

Hardware Enhancements The primary audio shortcoming of an AV or Power Mac is its lack of digital inputs and outputs (I/O). If you want to record to or from a DAT machine, you must connect its analog ins or outs to the Mac's ⅛-inch stereo miniplug jacks. Audio pros would rather keep a digital signal in the digital domain—especially considering that the Mac's analog circuits aren't up to professional audio par.

The answer: a Digidesign Audiomedia II, a NuBus board that provides digital I/O as well as digital-signal processing (DSP) circuitry. The Audiomedia II includes Digidesign's first-rate recording and editing program, Sound Designer II. Deck II also supports the Audiomedia II.

An Audiomedia II board has an additional benefit for CD-ROM producers: it enables you to use a Sound Designer II plug-in, L1 Ultramaximizer from Waves ($650, 615/588-9307). This amazing utility makes sound tracks sparkle. Technically, its peak-limiting features boost a recording's level while minimizing digital distortion, and L1 can downsample 16-bit audio to 8-bit. Practically, if you're serious about sound, you need L1.

Digitizing Video

An AV Mac's stock video-digitizer is adequate for QuickTime tinkering (making small, somewhat jerky-looking movies from your home videos, for example), but forget about making full-screen movies at 30 fps—a quarter-screen (320 by 240 pixels), 15-fps movie is about the best a stock AV machine can do.

That's where third-party hardware such as Radius's SpigotPower AV ($999, 408/541-6100) comes in (for more on the SpigotPower AV, see *Reviews*, June 1995). "Advanced AV Options" in the current issue covers this and other boards in detail, so I'll only say here that the SpigotPower AV is a superb enhancement—highly recommended. Unless otherwise noted, the following information applies to both the SpigotPower AV and a stock AV Mac.

Making Connections Connect your video equipment's video-out connector to the Mac's video-in connector. The Quadra 660AV and 840AV each provides two video-in ports—one for composite video and one for S-Video. You can switch between the ports using QuickTime's standard Video Settings dialog box. Power Mac AV models have only a single S-Video input and include an adapter for a composite cable. (See the informational graphic "Digitizing Video.") In this regard, the 660AV and 840AV are more flexible than the Power Macs that replaced them. I use both composite and S-Video equipment with a Quadra 840AV and a Power Mac 7100/80AV, and I much prefer using a dialog box to switch between video sources over disconnecting and reconnecting cables. In any case, use S-Video if your video equipment has an S-Video output because composite video is not as sharp.

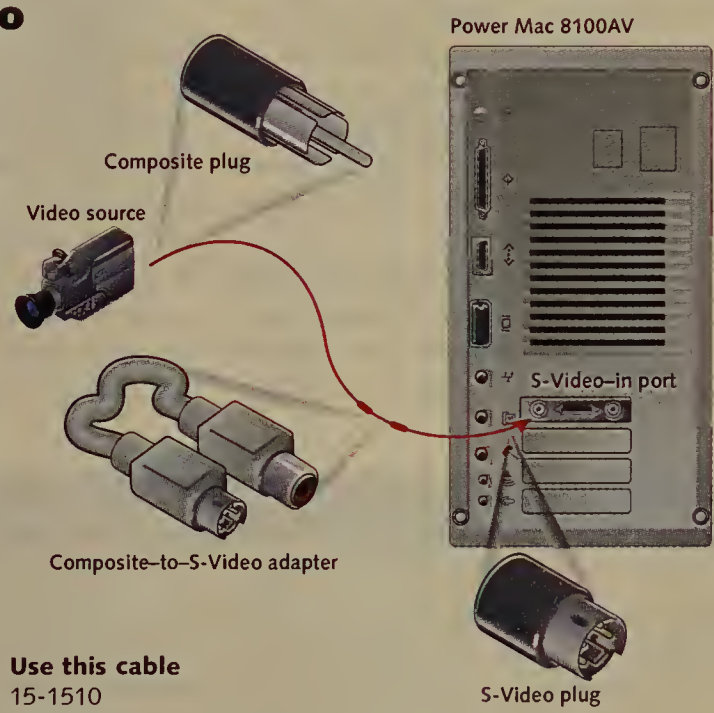
Top Techniques For smoother movies, run lean when digitizing, especially if you aren't using a SpigotPower AV or other hardware enhancement. Turn off AppleTalk and disable unessential extensions. And be sure to digitize movies onto your fastest hard drive.

Before digitizing, use the Image portion of the Video Settings dialog box to adjust brightness, hue, and other settings. I sometimes find QuickTime's default brightness setting too high; I usually turn it down to avoid washing out bright areas of the image. If you're videotaping a scene prior to digitizing, consider putting a gray or colored card in the scene and shooting for a minute or two. Then, before you digitize, adjust the Image dialog box's settings so that the card's on-screen color and brightness match the original's as closely as possible.

While you have the Video Settings dialog box open, specify the video compressor you want to use. If you have a SpigotPower AV or other third-party board, choose its compressor. If you have a stock AV Mac, use the Video compressor. If you'll be recompressing the movie later—perhaps after editing in Adobe Premiere—consider this trick: choose the Photo-JPEG compressor and specify postcompression. In the postcompression mode, the capture program defers compression until you stop recording. This enables the Mac to devote its full attention to keeping up with the incoming

Digitizing Video

Bringing video into your AV Mac—from a VCR, camcorder, or other analog source—for digitizing can be a little more complicated than bringing in audio. AV Quadras can use a composite or S-Video cable to import video, but to import composite video to an AV Power Mac (as shown) requires a composite-to-S-Video adapter. You can bring in audio at the same time using the cable in the diagram "Digitizing Audio."



To connect	Use this cable
S-Video to S-Video	15-1510
Composite to composite	15-1519
Composite to S-Video	15-1519 and adapter (comes with AV Power Macs)

(All part numbers are from Radio Shack catalog.)

video. You'll get stuttering movie playback in your video-editing program—the Photo-JPEG compressor is too slow for smooth movie playback—but you will get excellent image quality. When you make your final movie, specify the Video or Cinepak compressor.

To use postcompression in Fusion Recorder, choose Record Preferences from the Record menu and then check the Post Compress box. In Adobe Premiere, choose Recording Settings from the Movie Capture menu and check the Post-Compress Video box.

Multitrack Audio 2 Opcode Systems' DigiTrax lacks Deck II's array of professionally oriented features, such as support for Digidesign audio cards. But DigiTrax can be easier to use and it costs less. Its windows are similar to Deck II's. Visible in the upper right: DigiTrax's Equalizer window, which lets you boost and attenuate frequencies to improve audio quality.

If you're using a board such as the SpigotPower AV, consider recording the audio at 44kHz/16-bits for best quality. (To get a reasonably fast frame rate on a stock AV Mac, you may have to settle for a lower sampling rate and 8-bit sound.) If you do opt for 44kHz audio and you're using Adobe Premiere, be sure to use version 4.0.1—versions 4.0 and earlier have a bug that results in loss of audio sync when you're sampling at 44kHz.

CD-ROM producers must compress the final movies using the Cinepak compressor; other compressors don't allow for smooth playback from CD-ROMs. You can use any video-editing program to do your final Cinepak compression—just choose Cinepak as the compressor and specify a data rate of 250K to 280K per second, a safe upper limit for double-speed drives and QuickTime 2.0.

But you'll get better image quality if you use a funky Apple utility called MovieShop, available on AppleLink and eWorld. MovieShop has a user interface only a programmer could love, but it does a better job of compression than many video-editing programs, and it allows access to low-level Cinepak movie-quality options.

Another plus to using MovieShop is that you can batch-compress multiple movies at the end of the day. Given that a one-minute movie can take an hour or more to compress, this is a big plus. (A Power Mac, by the way, compresses much faster than a 680X0 machine, since QuickTime's compressors run in native mode on the PowerPC chips.)

Note that MovieShop has a bug that prevents it from compressing movies with 16-bit sound tracks. Be sure to downsample to 8-bit sound—for example, with Premiere's Downsample filter or, preferably, Waves' L1 utility and Sound Designer II—before compressing a movie with MovieShop.

Hardware Enhancements Besides a board such as the SpigotPower AV, the best thing you can do for an AV Mac's video-digitizing capability is to use a big, fast hard drive initialized with a SCSI Manager 4.3–compatible driver package. See the sidebar, "Optimizing AV Storage Performance," for more information.

Note that the Power Mac 7100/66AV is hampered by relatively slow NuBus transfer rates that make it less suitable than the 7100/80AV, Quadra 840AV, and 8100-series AV Power Macs for use with third-party video boards. To get 30-fps,

OPTIMIZING AV STORAGE PERFORMANCE

Sound and video demand not only plenty of storage for huge files, but data-transfer rates that can move those huge files around quickly. In the video world, a slow hard drive yields jerky-looking movies. With multitrack audio programs such as Deck II and DigiTrax, a slow hard drive can cause recording and playback errors on recordings containing numerous tracks.

Fortunately, hard drive transfer rates generally improve as capacities increase—for example, 1GB drives (the bare minimum for AV work) are faster than 500MB drives. So to start out in the fast lane, buy the highest-capacity hard drive you can afford.

The portion of the Mac OS that controls data transfers across the SCSI bus is called the SCSI Manager. The AV and Power Macs use an enhanced SCSI Manager, version 4.3, that takes better advantage of high-capacity, high-performance hard drives. Apple's own SCSI drivers—the ones that control the internal hard drives Macs ship with—support SCSI Manager 4.3. But do they all support it equally well?

Using Radius's VideoVision Studio digitizing hardware and a Power Mac 8100, Macworld Lab tested nine driver packages on a 9GB Micropolis 1991 Scorpio drive and a 4GB Seagate ST32550N Barracuda mechanism, both installed internally. All of the drivers performed well, but two yielded slightly better transfer rates with video captures: Surf City's Lido 7 ($95, 714/289-8543) and Casa Blanca Works' Drive7 ($89.95, 415/461-2227).

But these results come with an important caveat: Every high-capacity hard drive has its own unique array of performance-tuning settings, and a driver that performs well with one mechanism might not do as well with another. Thus, you shouldn't assume that Lido 7 and Drive7 will be the fastest driver packages available when used with mechanisms other than the two that Macworld Lab tested. Furthermore, optimizing your drive for video performance can hinder its performance on other tasks, so you may want to dedicate a disk drive for your video work.

If you're working with high-end video at a professional level, this issue is moot: high-end digital-video products such as Radius's VideoVision Telecast need better storage performance than even a fast hard drive and performance-tuned driver can provide—they simply require a dedicated SCSI-2 adapter board such as FWB's SCSI JackHammer, and can really benefit from a disk array (see "Superfast Storage," *Macworld*, July 1995). Prepare to break the bank on your storage system.

But if you're working with audio or with semipro video products such as the Radius SpigotPower AV or SpigotPro AV, a large hard drive with a fast driver is probably all you need. Keep it optimized using a disk-defragmentation utility (such as Speed Disk, included with Symantec's Norton Utilities), and remember to run lean when digitizing.

full-screen movies with a SpigotPower AV, for instance, you may have to resort to lower-quality compression settings. Adding a large cache card can also help.

Printing to Video

AV Macs also have a video-out connector to which you can attach a camcorder or videocassette recorder. This enables you to videotape the Mac's screen image—to make Mac training tapes, to record an on-screen presentation, or to tape a finished QuickTime movie. (There are also software packages, including Motion Works' $99 CameraMan and Strata's $149 Instant Replay, that can record screen activity as QuickTime movies, which you can then edit and integrate with other movies before saving to tape.)

Making Connections Power Mac AVs contain a single S-Video output and include an adapter cable for a composite connector. As is the case with video-in, the Quadra 660AV and 840AV models are more flexible than the Power Mac AVs, sporting both composite and S-Video outputs. The Mac's screen image is sent to both ports.

If your video recorder supports S-Video, connect the AV's output to the recorder's S-Video input. (See the informational graphic "Writing Video and Audio to Tape.") If the recorder supports only composite video, connect the AV's output to the recorder's composite input. (On Power Macs, use the output adapter cable.) To record the Mac's audio signal, too, connect the speaker jack to the recorder's audio-input jack or jacks. You can also connect a TV set to the video recorder's video-out jack so you can see the Mac's screen. With a camcorder, you can omit this step and just squint into the viewfinder, although connecting an external monitor to the camcorder will make videotaping a lot easier. (Many companies sell 4-inch color LCD monitors with composite-video inputs; they make ideal monitors for camcorders or VCRs.)

Top Techniques The key to rerouting the Mac's screen image to video is the Monitors control panel. Open it, specify the desired number of colors, and then click on the Options button. Click on the button labeled Display Video on Television. Next, in the Select Monitor Type list, choose the appropriate resolution.

For recording Mac screen activity—the menu bar, windows, and the like—choose 512 by 384; this will prevent the outer edges of the screen image from being cut off when you save the image in NTSC format. Also check the Use Flicker-Free Format box; this prevents thin horizontal lines, such as those in window title bars, from flickering. (Note that for the flicker-free format to be available, the Monitors control panel must be set to 256 or fewer colors.)

For recording QuickTime movies, choose 640 by 480 and do not check the Flicker-Free box. Note that because TV sets overscan—they project an image slightly larger than will fit on the picture tube's surface—the outer edges of the movie will not be visible on TV sets. TV producers take overscan into account during production by ensuring that titles and essential parts of a scene fit within a safe zone—QuickTime producers should, too.

When you click on OK, a dialog box appears asking if you really want to switch the screen image. Verify that your video recorder is properly connected—if it isn't, you won't be able to see the Mac's screen image on the television when it disappears from your Mac monitor—and then click on the Switch button.

If you have a SpigotPower AV board, use its SpigotPower AV Player application to play movies created with the board. Otherwise, you can use a video-editing program or Apple's Movie Player utility to play movies that you want to videotape. With QuickTime 2.0 and the Movie Player 2.0 application, you can use the Print to Video command's zooming options to play a quarter-screen movie in full-screen mode. The relative fuzziness of television (compared with a sharp computer monitor) will smooth out most of the jaggies that you'd expect to see on the Mac's screen.

Because navigating and choosing commands can be difficult when the screen is displayed on a fuzzy TV set or in a tiny viewfinder, make an alias of the Monitors control panel and stash it on the Finder's desktop, or create a keyboard shortcut to the control panel with QuicKeys or another macro program. This will make it easier to reactivate the Mac's monitor when you finish recording.

Hardware Enhancements For Quadra 840AV owners, a VRAM upgrade to 2MB is a must. And although the Radius SpigotPower AV provides full-screen, full-motion video, it doesn't allow you to play movies in full 24-bit color. Because of the way Apple implemented its AV architecture, the SpigotPower AV board is limited to 16-bit movie output (thousands of colors). This results in some slight color banding. For full-screen, 24-bit output, consider Radius's $1599 SpigotPro AV, which should be shipping by the time you read this.

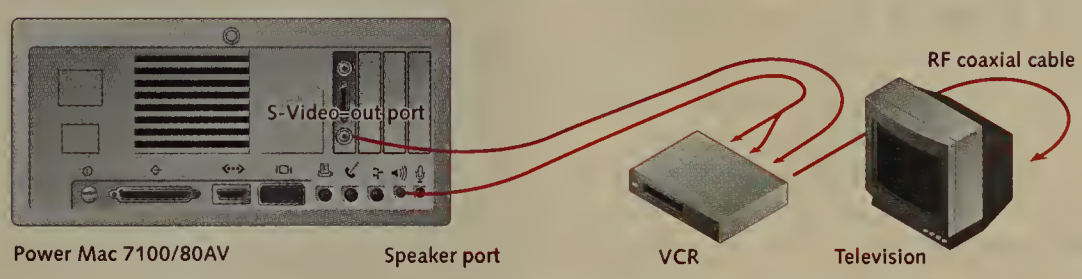
The Last Word

The AV Macs can't compare with a Mac decked out with a $15,000 Radius Telecast video-editing system or a $7990 Digidesign Pro Tools III audio system, but they're well equipped to handle low-budget audio- and video-production projects.

As for big-budget tasks, the Centris/Quadra 660AV and Power Mac 6100 series lack the expansion capabilities needed for serious multimedia work, and the Power Mac 7100/66AV has NuBus slot limitations that hamper its ability to handle digital video. But the 7100/80AV, the 8100 series, and the Quadra 840AV are great foundations on which to build high-end editing systems.

The AV Macs also exemplify Apple's lead over the Windows world in multimedia. While Windows users struggle to get sound boards and CD-ROM drives working on their so-called multimedia computers, AV Macintosh owners are not only enjoying hassle-free multimedia playback, but versatile multimedia production, too. **m**

Writing Video and Audio to Tape



After you've created your digital multimedia production, you can save it in analog format on videotape using the same cables shown in the diagrams "Digitizing Audio" and "Digitizing Video." (If your VCR lacks an S-Video input, use the S-Video–to–composite-video adapter included with the Power Mac.) To attach a television, simply run coaxial cable from the VCR's RF output to the television's RF input.

Contributing editor JIM HEID has produced three CD-ROMs; the latest, Macworld Power User Clinic, will be included with his revised best-seller, *Macworld Complete Mac Handbook*, fourth edition (IDG Books Worldwide), available in August.

MW LAB

Advanced AV Options

MACWORLD LAB SHOWS YOU WHICH VIDEO-CAPTURE CARDS BEST EXTEND THE AV MACS' REACH

by Deke McClelland

Apple's AV technology adds another dimension to multimedia computing. Out of the box, AV-equipped machines can capture QuickTime movies with CD-quality (16-bit, 44kHz) sound from videotape or laser disc. You can then edit the movies, integrate clips into on-screen presentations, and even record the movies back onto videotape. Depending on the video-compression settings and the hard drive speed, you can capture quarter-screen movies (320 by 240 pixels) with millions of colors, 16-bit stereo sound, and as many as 15 frames per second (fps). You can also expand the movie during playback to full screen, 640 by 480 pixels.

But while AV Macs represent the best in preconfigured multimedia machines, even the foremost among them, the Power Mac 8100AV, may not be good enough. Considering that commercial film and videotape standards range between 24 and 30 fps, it's not surprising that 15 or fewer frames per second make for jerky and unnatural results. There's also the problem of frame size. Quarter-screen movies may be acceptable within multimedia presentations and CD-ROM clips, but they look pretty cheesy when they're output to videotape. Whether you set your sights on professional-level Betacam or consumer-quality VHS, or you want to distribute full-screen movies on CD-ROM, you'll need something better than Apple's stock-issue AV technology.

As I write this, three digital-video alternatives under $5000 are available, all from Radius (408/541-6100). These are the SpigotPower AV ($999), the Spigot II Tape ($849), and the VideoVision Studio 2.0 ($4849). Only the VideoVision Studio provides audio jacks; the two Spigot boards rely entirely on the computer's sound capabilities. Videowise, the Spigot II Tape provides both composite-video and S-Video input and output jacks. The VideoVision adds an extra set of input jacks along with an expansion

port. Only the SpigotPower AV is entirely without external sockets, capturing and playing video exclusively through the computer's AV ports. A fourth board, the $1599 SpigotPro AV, should be available from Radius by the time you read this. The SpigotPro AV will work exclusively with AV Macintoshes but will provide its own composite and S-Video outputs. (At press time, RasterOps' [408/562-4200] digital-video product line was in a state of transition, and the company chose not to participate in this article.)

These boards are insufficient for online broadcast-quality editing, which requires sophisticated hardware that can run more than $10,000 (see "Video-Editing Tools," *Macworld*, June 1994).

Spigot Puts the Power in AV

For owners of AV Macs, the SpigotPower AV (nicknamed the SPAV, rhymes with *have*) makes good on the promise of consumer VCR-quality digital video, boosting an AV Mac's input and output capabilities to 640 by 480 pixels at 30 fps. (This assumes you have a large, fast, defragmented hard drive, as explained in the feature "Multimedia Secrets," in this issue.) While an unaided AV Mac is sufficient only for recording small movies for inclusion in screen presentations, the SPAV is perfect for any on-screen job, as well as for comps, proposals, and in-house training movies recorded to videotape.

Hardware Considerations The 7-inch SPAV plugs into a NuBus slot. On the Quadra 840AV, a digital audio/video—or DAV (pronounced *dave*)—connector at the board's base plugs into the matching slot on the logic board. Centris or Quadra 660AV owners must buy a NuBus adapter with a DAV slot. The DAV connection allows the SPAV to process data through the on-board video jacks. (Apple is revising the DAV slot specifications, and future Macs will have PCI bus slots—two strikes against SPAV compatibility. Radius plans to support the new DAV technology.)

On the AV Power Macs, rather than integrating video capabilities into the logic board, Apple supplies a separate AV Technologies board that plugs into the Power Mac's PDS. The DAV connector at the SPAV's base goes unused. Instead, a ribbon cable connects a separate DAV slot at the top of the SPAV to a corresponding slot at the top of the AV board. This prevents the SPAV from working with the Power Mac 6100AV, which can accommodate the AV board *or* a NuBus adapter, but not both.

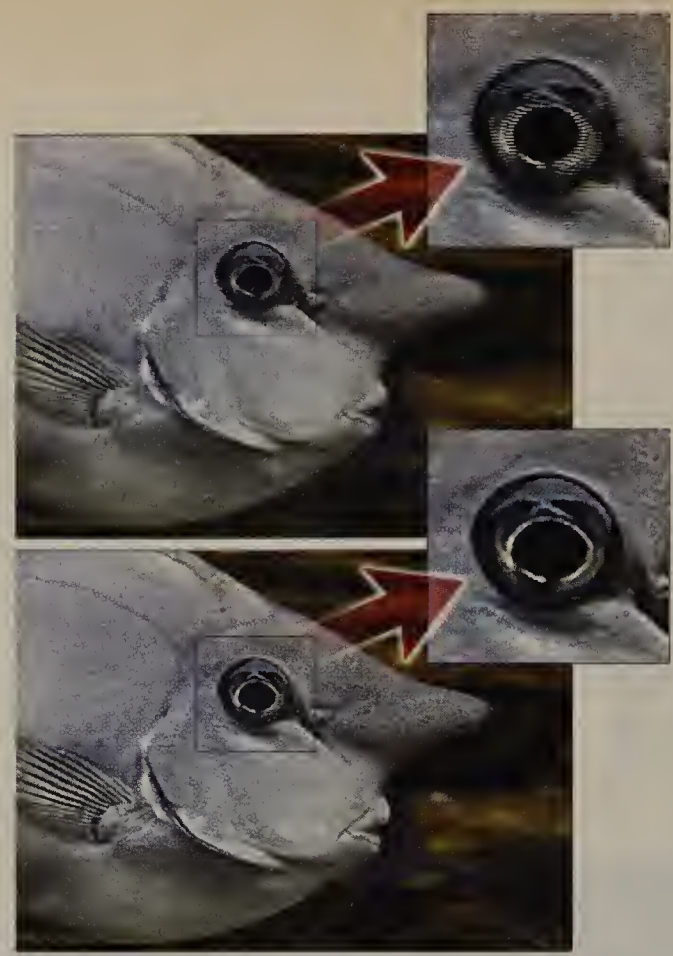
On-Board Compression The SPAV helps capture larger, faster movies by compressing frames itself, so your Mac doesn't have to. You can select one of two compression/decompression (codec) options, JPEG or interlaced JPEG (JPGI). The JPEG codec captures a single NTSC field, which translates to just 240 horizontal lines per frame. (When recording from a European PAL video deck, the JPEG codec captures 288 horizontal lines.) The SPAV hardware then doubles each line to produce the 480-pixel (or the PAL 576-pixel) frame height. Though movies compressed with this codec retain less information, they are Photo JPEG–compliant, so you can open and edit frames inside Adobe Photoshop or another image editor. The JPGI codec captures both the even and odd fields within each frame (hence Radius's claims for playback speeds of 60 NTSC or 50 PAL fields per second). Interlaced frames typically look ragged on an RGB monitor—especially when the movie contains lots of motion—but they look better played back on a television or recorded to videotape (see the screen shot "Interlace Artifacts").

Unaided AV Macs use software codecs, which are slow. To increase the frame rate or prevent frame dropping on AV Macs you can lower the compression—that is, increase the Quality setting—or turn off compression entirely. With the SPAV, compression occurs almost instantly, enabling the board to process data at about 2.2MB per second (MBps), according to Radius. So, if you're having problems capturing 30 fps because your hard drive can't process more than,

say, 1.6MBps—typical of Apple-supplied internal drives—you can increase the compression (lower the Quality setting) to eliminate dropped frames.

SPAV Performance As the first AV-compatible QuickTime compression board, the SPAV has a few kinks. It's not compatible with QuickTime 2.0, so most users will have to remove the new QuickTime—as well as all preference files associated with it—and install its predecessor, version 1.6.2, from the SPAV disks. (Radius planned to release updated software that supports QuickTime 2.0 by the time you read this.) It's also worth noting that the SPAV requires you to configure the AV port to display thousands of colors, compared with millions when you're using the AV board on its own. Though the SPAV captures 24-bit movies to disk, it can play them back with only 32,000 colors because it has to load special code into the AV Mac's VRAM. (In contrast, an AV Mac can display only 16-bit video when recording, but can play back at full 24-bit color.) The upcoming SpigotPro AV will rectify this problem by supplying its own 24-bit encoder chip and outputting video through on-board jacks.

If you can live with old QuickTime and thousands of colors, the SPAV performs remarkably well. In Macworld Lab's tests, the SPAV easily trounced unaided AV Macs. On both a Quadra 840AV and Power Mac 8100/80AV equipped with the SPAV, we consistently recorded full-screen movies at rates above 29 fps when recording 8-bit, 22kHz stereo sound. Compare this with an AV Mac on its own: for frames one-fourth the size, the Quadra 840AV never exceeded 5 fps, and the Power Mac 8100/80AV didn't exceed 13 fps. If you already own an AV Mac, the SPAV is a singularly affordable solution for multimedia and corporate video producers alike. Macworld Lab's only complaint was that we consistently encountered dropped frames at the highest Quality setting (called Most). Although we were able to eliminate this problem on the Power Mac 8100/80AV by dropping the Quality setting to High or lower, this solution may prove unsuitable for assembling training videos or professional comps. Radius also suggested that a faster hard drive—ours supported sustained write rates of 2.3 MBps—might solve the problem.



Interlace Artifacts These images compare a frame from a Hi-8 video as it appears when digitized with the SpigotPower AV's JPGI codec (top) and standard JPEG codec (bottom). JPGI retains the even and odd fields, resulting in erratic horizontal lines when the frame is viewed on an RGB screen. However, on a television, the even and odd groups of horizontal lines are played sequentially, resulting in more fluid motion. By contrast, the JPEG codec captures a single field only. JPEG movies look better on RGB monitors.

Spigot II Tape Takes the Edge off AV Envy

The Spigot II Tape is the least capable of the three Radius products and in some areas is less capable than an unaided AV Mac. Like Apple's AV Macs, the Spigot II Tape lets you record quarter-screen movies and scale them up to 640 by 480 pixels during playback by doubling the pixels. It also accommodates both composite-video and S-Video hookups. However, the Spigot II Tape is limited to 16-bit video, compared with 24 bits for an AV Mac; it provides no RGB port, so you have to preview effects on an NTSC

MW LAB

How Fast Are Video-Capture Boards?

Test file is a 60-second movie. For frame-rate and data-rate tests, longer bars are better. For file-size test, smaller numbers are better, unless frames are dropped.

Dropped frames

When recording QuickTime movies to integrate into multimedia CD-ROM titles or interactive presentations, you need a board that can record quarter-screen (320-by-240-pixel) movies at rates of no less than 15 frames per second (fps). If you intend to record edited movies back to videotape, don't settle for anything less than full-screen (640-by-480), 30-fps recording with no dropped frames. No matter what you're doing, dropped frames are unacceptable. The movie hangs for a moment whenever a frame is dropped, creating a sudden jerk in the action.

We looked at the file sizes of the recorded movies. Better compression means smaller files, which means more files fit on a disk; it also means less data has to be transferred to the hard drive, which ensures fewer dropped frames.

Even though the Spigot II Tape is performing at 2 MBps, it still drops frames. The SpigotPower AV and VideoVision Studio can handle lower rates because they have less data to write.

The VideoVision Studio was the best performer overall—never dropping a frame—with the SpigotPower AV a close second. The Spigot II Tape is adequate if you don't need to record more than 15 fps; at 15 fps in normal quality tests (results not shown) the board did not drop frames. Apple's unaided AV circuitry was the least consistent and slowest performer in our tests.

WITH A QUADRA 840AV

	Average Frame Rate (in fps)		Average Data Rate (in MBps)		File Size (in MB)	
	without sound	with sound	without sound	with sound	without sound	with sound
Most quality/least compression						
Quadra 840AV (320 x 240)	4.10	3.94	0.12	0.16	7.5	9.8
Spigot II Tape (320 x 240)	13.86	13.77*	2.00	2.00*	121.8	123.3*
SpigotPower AV (640 x 480)	29.80	29.61	1.80	1.90	113.5	102.3
VideoVision Studio (640 x 480)	29.94**	29.95**	1.80	1.80	111.2	116.3
Normal quality/medium compression						
Quadra 840AV (320 x 240)	4.51	4.32	0.10	0.14	6.1	8.3
Spigot II Tape (320 x 240)	28.92	27.71*	2.10	2.00*	128.0	123.5*
SpigotPower AV (640 x 480)	29.86	29.86	1.10	1.10	66.4	69.5
VideoVision Studio (640 x 480)	29.97	29.95	0.95	0.99	56.8	59.9

*Sound captured in 8-bit, 22kHz mono. **Most quality, adaptive compression.

monitor; and it does not support PAL or QuickTime 2.0. In fact, the Spigot II Tape's sole advantage over unaided AV is its frame rate. Radius claims most users can expect 30 fps, twice what you'd expect from an AV Mac. During lab tests, we were able to achieve the highest average frame rates—28.92 fps—when recording video without sound and with a medium Quality setting (Normal). When we maximized the Quality setting—thereby increasing the amount of data per frame that the board had to write to disk—the frame rate went down dramatically, as low as 13.77 fps on a Quadra 840AV.

Sound Reasoning The Spigot II Tape offers no audio processing capabilities, leaving you at the mercy of your Mac's sound-in port. Most Quadras and all 68030 machines allow you to capture monophonic sound only, and some older machines, such as the IIci, provide no audio inputs at all. Aside from the AV machines, only a few Macintoshes—among these the Quadra 630 and a few of the recent LCs and Performas—provide stereo input. For the price, I don't expect the Spigot II Tape to incorporate CD-quality sound, but stereo inputs would have been nice.

Regardless of your Mac's sound-handling abilities, the ScreenPlay II utility bundled with the Spigot II Tape doesn't allow you to control audio-input levels when recording, and it is limited to monophonic sound. You can get around both problems by recording inside Adobe Premiere, which offers control over recording levels, but according to Radius you might run into a few bugs. So while the Spigot II Tape has AV technology beat when it comes to frame rate, it simply can't match AV sound.

Pick a Frame, Any Frame Using the ScreenPlay II utility with the Spigot II Tape, you can capture a single frame by clicking on the frame in the video preview window (upper left) and dragging it to the desktop. The frame that the utility captures is not the one you see when you click but the video frame that's playing at the moment you drop. Also, the display inside the preview window freezes when you start dragging, but the video keeps playing. Consequently, you have to look at the NTSC monitor to decide when to release the mouse button. After you drop the frame, ScreenPlay puts it in a full-screen window (lower right).

Frame Quality The Spigot II Tape provides on-board compression, but this is not as capable as the SPAV codecs, nor is it compatible with them. The name of the codec, Spigot II Tape Rough, tells it all. You can change the compression setting during recording, but if you opt to recompress the image using the Save As command, you have access to just one compression option, which produces average results (despite the appearance of an inoperative Quality slider). Also, a quarter-screen movie compressed with Spigot II Tape Rough takes up more room on disk than the same movie recorded at full-screen size and compressed using the SPAV's JPGI set to the highest Quality setting. For example, a 60-second movie with sound recorded by Macworld Lab and compressed with SPAV JPGI consumed at most 114.2MB on disk. The same movie recorded and compressed with the Spigot II Tape took up at the very least 120.9MB—with a lower Quality setting. When we similarly lowered the quality for the SPAV movie, the file size shrank to 69.3MB.

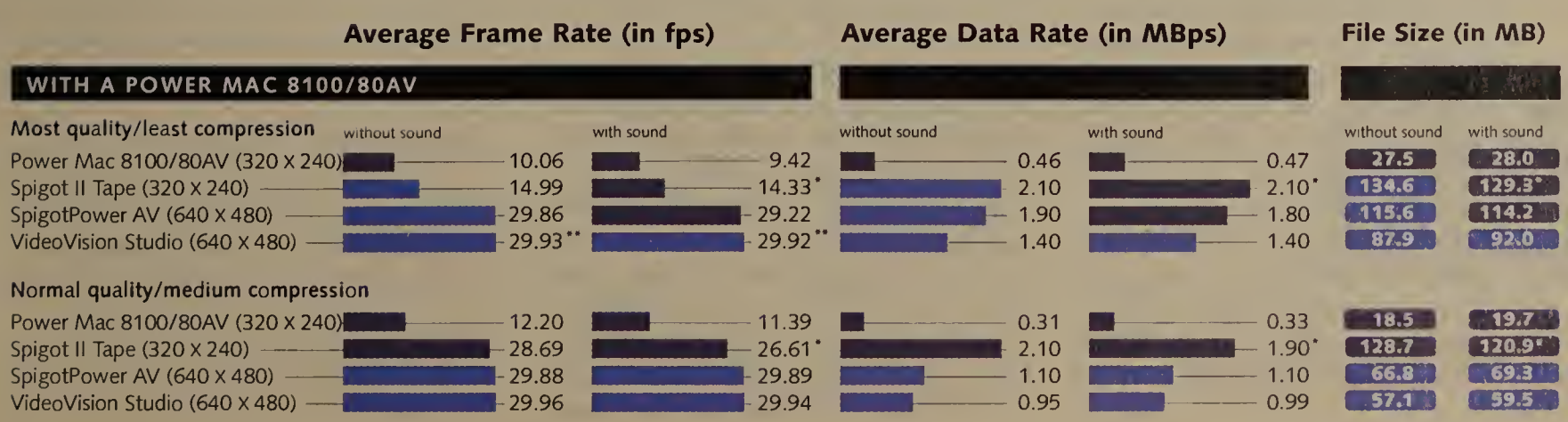
The Spigot II Tape isn't meant to compete with the SPAV; it's meant to bring medium-quality video-capture capabilities to 68040 and 030 machines. In that context, it's a fair-priced package that performs adequately despite a few vexing oddities. For example, the ScreenPlay II utility's Save As command invari-

BEHIND OUR TESTS

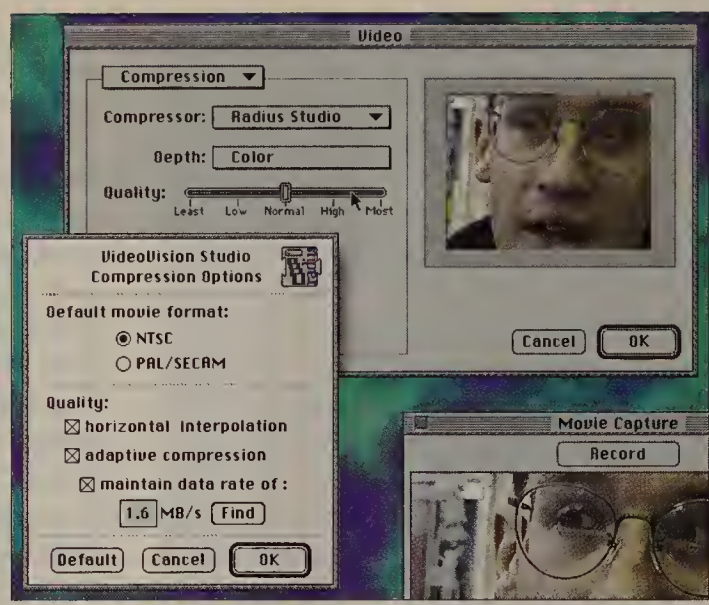
Macworld Lab tested the built-in AV capabilities of the Quadra 840AV and the Power Mac 8100/80AV, and compared them with three video-capture boards from Radius—the SpigotPower AV (SPAV), Spigot II Tape, and VideoVision Studio 2.0—installed in the same machines. The tests included capturing a 60-second movie without sound and then with sound (8-bit, 22kHz stereo except for Spigot II Tape). For the unaided Mac and Spigot II Tape tests, we captured the movie at 320 by 240 pixels, the best acceptable capability this hardware provides; for the SPAV and VideoVision tests, we captured the movie at 640 by 480 pixels.

For all tests, we set the boards to record at 30 fps, the highest rate QuickTime permits (we installed System 7.5 with QuickTime 1.6.2). We used Adobe Premiere 4.0.1 to measure the average data rate, the average frame rate, and the file size. We also looked at image quality by capturing the movie with minimum compression, yielding high image quality, and compared the results with the movie captured with moderate compression and image quality. To adjust the compression settings, we used the quality slider in Premiere or Radius's ScreenPlay II.

We captured the movie using Premiere 4.0.1 for all tests, except for those with the Spigot II Tape, where we used ScreenPlay II.—**Macworld Lab testing supervised by Danny Lee**



ably writes individual frames to disk, which takes roughly 20 times as long as the standard Save command no matter what codec you use. And if you cancel the Save As operation, ScreenPlay II throws away the unsaved frames. However, you can capture single full-screen interlaced images by simply dragging a frame from a live video and dropping it on the desktop (see the screen shot "Pick a Frame, Any Frame"). If sound isn't important and quarter-screen movies are all you need, the Spigot II Tape is a satisfactory package with modest hardware requirements and a moderate entry price.



Intelligent Compression The VideoVision Studio is the only board tested that can intelligently compress frames to maintain a consistent data rate and help prevent dropped frames. After control-clicking on the Quality slider inside Premiere to bring up the special Studio Compression Options, determine the maximum data rate of your hard drive by clicking on the Find button. Then enter a slightly smaller value into the option box, to allow for a margin of error.

VideoVision Studio Integrates Sound and Video

Now in its second version, the VideoVision Studio is designed for medium-quality video production, such as corporate presentations and training videos. It consists of three parts: the VideoVision NuBus board, which outputs to RGB video and handles the 24-bit decoding, encoding, and frame buffer operations; the Studio daughterboard, which provides JPGI compression; and a connector strip, which supplies the video and audio input and output jacks.

Cabling and Connectors The connector strip includes two groups of video/audio input jacks; you can record from either (but not both at the same time). A third pair of audio-only inputs—labeled Mix In—routes sound directly to the output jacks. You can't record sounds from the Mix In sockets to disk; in fact, the sockets' purpose is the opposite: to allow you to output digitized sounds. For example, to record a QuickTime movie to videotape, you must cable the Mac's onboard output jack to the Mix In connectors.

The VideoVision captures stereo sound, but it's limited to 8-bit, 22kHz input. This means AV and Power Mac owners are better off cabling sound through the microphone jacks on their motherboards. Once you capture CD-quality sound, you can play it out through the connector, but only because the VideoVision capture board is out of the loop. Frankly, the product's sound capabilities are mediocre when you consider its steep price.

Studio Options The Studio daughterboard provides the best compression options available to any board we tested. You have access to only one codec—JPGI (which is not compatible with the SPAV's)—specifically designed for recording to interlaced video. But rather than specifying a Quality setting that's carved in stone, you can activate the Adaptive Compression function, which increases compression when frame transitions become complex. As a result, the VideoVision is less likely to drop frames.

To compress the video according to the data rate of your hard drive, you can activate the Maintain Data Rate option (see the screen shot "Intelligent Compression"). This option lets you test the throughput of your hard drive and then accordingly set the rate at which it sends data to the VideoVision. The software maintains the highest Quality setting possible without exceeding this rate.

With these kinds of flexible options, it's no surprise that the VideoVision Studio performed well in Macworld Lab's tests. With adaptive compression, we were consistently able to record movies with no dropped frames at rates between 29.92 and 29.95 fps on both the Quadra and Power Mac platforms.

The Last Word

All three products come from Radius, which fared poorly in our technical-support tests. While they answered our questions accurately, support technicians demonstrated little interest in our low-level problems and were sometimes condescending. While knowledgeable users might be satisfied, inexperienced souls will need to be thick-skinned and persistent. We waited on hold for prolonged periods of time—never less than 8 minutes—and it's a toll call.

The VideoVision provides excellent video-compression capabilities and impressive image quality, but its sound options are disappointing. Its comparatively high price warrants 16-bit, 44kHz sound, as well as sound output through the connector strip. All told, the VideoVision is not a good value, especially when compared with an AV Power Mac plus a SpigotPower AV board. Meanwhile, though the Spigot II Tape is adept at recording quarter-screen video, its unexceptional software and lack of audio support dampen my enthusiasm. Only if you own an aging Mac II or Quadra and you have no intention of upgrading to an AV Power Mac should you consider the Spigot II Tape—and be forewarned: you'll be relying on your Mac's built-in sound.

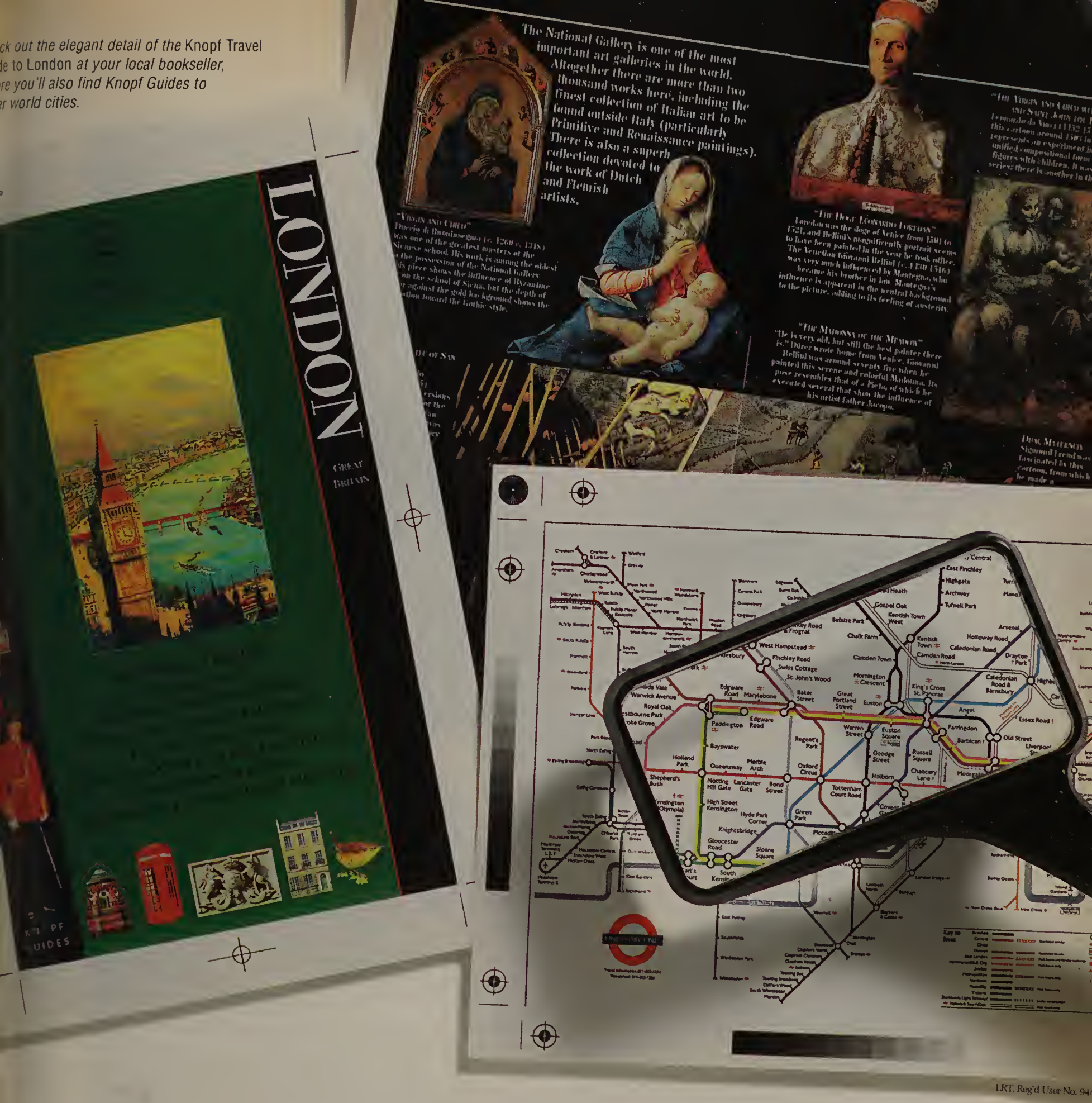
The SpigotPower AV is easily the best value of the bunch. Provided you own an AV Mac, the SPAV represents a straightforward and powerful solution, delivering full-screen, full-motion, interlaced video that can be every bit as good as movies produced with the VideoVision. Oh, the SPAV may occasionally drop frames if your system isn't up to snuff—a problem the VideoVision all but eliminates with its adaptive compression—but you may be able to correct this problem by adding a cache card or reinitializing your hard drive. The SPAV's one downside is that it can play back no more than 32,000 colors to videotape. If you require full 24-bit output, keep an eye out for the SpigotPro AV. m

DEKE McCLELLAND is the author of *Mac Multimedia and CD-ROM for Dummies* (IDG Books Worldwide, 1995), which makes sense of the Mac's sound and video capabilities.

DIGITAL-VIDEO BOARDS

Frame size, average frame rate, on-board QuickTime compression, and price were factors in choosing the best video-capture and playback hardware. One of the least expensive options is also the best.

SpigotPower AV Attach this board to an AV Mac's DAV slot, and you can record, edit, and play back 640-by-480-pixel, 30-fps, interlaced video. Dropped frames are a problem, but this powerful board handles any job short of broadcast-quality video. **Company:** Radius. **List price:** $999.



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MACWORLD NAMES THE TOP TEN CD-ROM TITLES

The Year's Best CDs

IF ONLY REAL LIFE WERE LIKE A GOOD multimedia CD. Instead of going to the grocery store, for instance, you could click on a food icon, and then drag the food you want into your refrigerator. In need of a vacation in an exotic land? No need for a long plane ride: one click, and you're in Thailand. And how about tickets to a movie? Forget standing in line; just click here.

Unfortunately, real life is a bit more taxing than a multimedia CD's point-and-click allure would have you believe. But with a good CD, you can escape from the rigors of real life, if only for a little while. And with the very best CD titles, you get something to show for your journey—an understanding of another culture, maybe, or a newfound appreciation of a subject that once seemed arcane or inaccessible.

Make no mistake, plenty of CDs have far too many icons, impenetrable interfaces, gratuitous video, and—sin of sins—lousy content. But the medium is maturing and titles are proliferating; as a result, there's an increasing number of good CDs. For this article, I picked the ten CDs of the past year with the most useful, stimulating, or entertaining content; elegant, straightforward, or clever interface; and a strong replay factor, meaning I'd want to take the CD for a spin more than once or twice.

As with previous *Macworld* Top Ten CD lists, I focused only on titles developed for CD-ROM. Fonts, shareware, clip art, stock photos, and other matter that simply use CDs as a storage medium were not included. I didn't look at games or interactive movies, except those with significant educational advantages; games are Steven Levy's department (see "1994 Macintosh Game Hall of Fame," *Macworld*, January 1995).

So—without any further ado—here are *Macworld*'s Top Ten CDs.

BY JAMES A. MARTIN

GORDON STUDER

MAUS
LEONARDO
CINEMANIA95
DAZZELOIDS
BOOKSHELF 94
INTERACTIVE

ARTS AND CULTURE

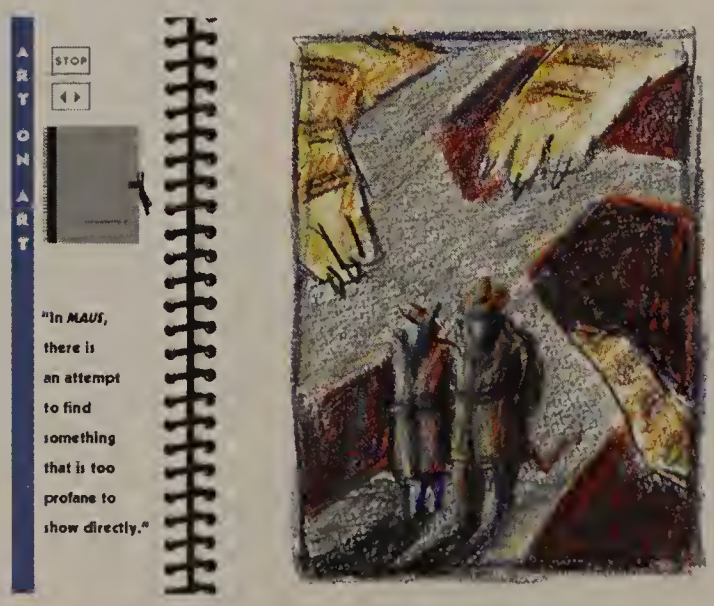
The Complete Maus

Voyager
914/591-5500, 800/446-2001
$49.95 list price

Maus, the Pulitzer Prize–winning graphic novel, is a well-crafted story of how a common, ordinary man survived the Holocaust. The Complete Maus, a multimedia CD that includes the original two-volume book as well as a wealth of supplementary materials, offers rewarding insights into how that story came to be told.

To create *Maus*, cartoonist Art Spiegelman interviewed his father, a death-camp survivor, and used the comic-book format to tell his story—using mice to represent Jews and cats to portray Nazis.

The Complete Maus CD contains audio excerpts from the tapes Spiegelman made of his interviews with his father, as well as the author's transcripts; a facsimile of the original three-page version of *Maus*; fascinating audio interviews with the author; videos that Spiegelman shot on visits to former concentration camps; a step-by-step look at how he created a single page of the book; and more. It's best to read *Maus* first in book form—that is the medium it was designed for, after all. (Plus, unless you have a 20-inch or larger monitor, the scrolling required to read the book on screen gets rather tedious.) Then explore The Complete Maus—a shining example of how a work in one medium can richly augment a work in another.



The Complete Maus
Art Spiegelman's *Maus* is in black and white, but the artist considered using color, as this unpublished sketch—one of many from the CD—illustrates.

4 Paws of Crab
The CD's striking design is particularly evident in the ingredients section, shown here. Icons (left) help you move quickly to other sections, adjust the volume level, get help, or exit.

4 Paws of Crab

Live Oak Multimedia
510/654-7480, 800/454-7557
$44.95 list price

Most CDs offer no authorial voice, no singular vision, no intimate connection to the user—just fragmented information or amusements buried beneath icons. 4 Paws of Crab is a rare exception: it's a personal, quirky CD with a strong narrative and a visual style all its own.

Billed as a "narrative Thai cookbook," 4 Paws of Crab is really about friendship, cultural differences, and the adventure of foreign travel, with food as an interesting backdrop. The CD has two narrators: Nora, a college student who goes to Thailand to study; and Bird, a Thai restaurant owner and fellow student whom Nora befriends and who later travels to San Francisco. Along with the stories of Bird's and Nora's travels, the CD includes plenty of tantalizing Thai recipes and a gorgeously illustrated guide to their ingredients.

The real heart of the CD, however, is the section titled "Mirrors," which includes interactive, narrated photo journals of Nora's and Bird's experiences in—and their observations of—each other's countries. Their stories are often illuminating and always engaging. Nora notes that Thai people rarely use telephones; dinner with friends is usually a result of a chance encounter rather than a prearranged event. As a result, communication in Thailand can be much more direct, spontaneous, and personal than in the United States, with an emphasis on sharing stories. 4 Paws of Crab takes that time-honored tradition of storytelling and deftly reinterprets it for the information age. And that's what ultimately makes it such an intriguing and rewarding CD.

CHILDREN/YOUNG ADULTS

Harry and the Haunted House

Brøderbund Software
415/382-4700, 800/776-4724
$39.95 list price

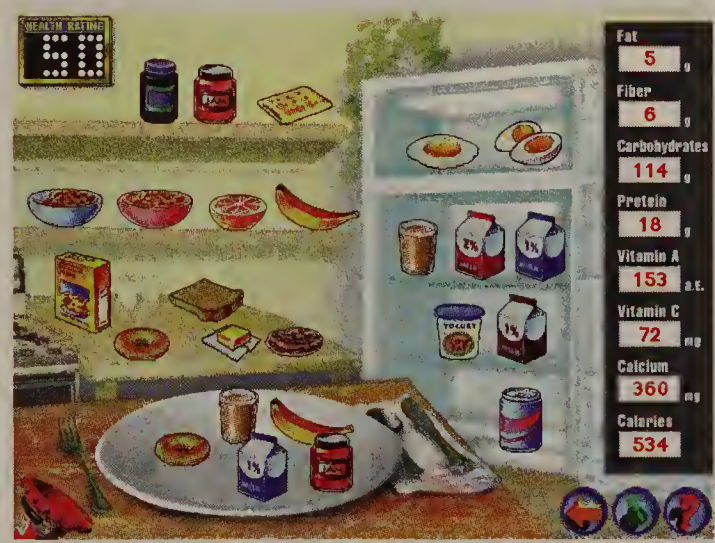
It's one of the oldest stories in the world: shaky-kneed kids venture into a mysterious, dark, and scary house to retrieve a lost baseball. But in Harry and the Haunted House, one of a series of Living Books from Brøderbund, the yarn is given a fresh spin by the wonderful drawings, clever animations, and, in particular, interactive exploration.

After the narrator reads the text (in either Spanish or English), you can use your mouse to click on and activate just about any object on a page. In a haunted house, you never know what mysteries you will uncover, and this disc wisely sidesteps the tired old skeleton-rattling stuff. Instead, you are treated to delightful surprises such as beetles that jump rope, form a conga line, and sing a chorus of "Blow the Man Down," accompanied by the ghost of an old sea captain. There are also nine original, and quite good, music compositions, which you can play on a stereo CD player, or on your CD-ROM drive using AppleCD Audio Player or another music utility. This CD is a joy from start to finish; even its closing credits are a hoot.

Dr. Helga Health'nstein's Body Fun
Star Press Multimedia
415/274-8383, 800/782-7944
$29.95 list price
To many young adults and preteens, a balanced meal is a cheeseburger, a double order of fries, and a large Coke—and how about a hot apple pie for dessert? Meanwhile, exercise is what they pretend to do when the gym teacher is paying attention. Dr. Helga Health'nstein's Body Fun could change that.

This CD's games—some of them quite challenging—make you think about what you eat, how you exercise, and the consequences, both now and in the future. Four obstacle courses represent periods of life, from school to retirement. Along each course, you select available foods or pick an exercise routine. The choices you make determine your health rating. At the end of each course, you face a formidable opponent in an athletic event; whether you're nearly eaten by a crocodile in the Nile or you win the midnight marathon in Greece depends on your health score. There's also a body scanner, a video of open-heart surgery (too intense for wee ones), and a trip down Addiction Alley (my favorite part). There's no guarantee that after playing Dr. Helga Health'nstein's Body Fun your kids will turn up their nose at fast food. But who knows? Maybe they'll skip the apple pie for dessert.

Harry and the Haunted House
The book comes to life with the help of a few mouse-clicks. Click on the centipede (bottom left), for instance, and two beetles jump on for a piggyback ride.



Dr. Helga Health'nstein's Body Fun
When you place food on a plate, the program tallies the food's fat, fiber, protein, and other contents. Pick wisely: your health rating (top left) goes up or down depending on the foods you choose.

ENTERTAINMENT

Dazzeloids
Voyager
914/591-5500, 800/446-2001
$49.95 list price
Dazzeloids is delicious nonsense of the point-and-click variety, a wildly original, candy-colored wallow in silliness complete with songs, interactive stories, and the occasional Transglumifier.

The Dazzeloids are "CD-ROM superheroes on a binge against boredom." Their members include leader Anne Dilly Whim, who dresses in corseted Elizabethan clothing and talks like Elly May Clampett from "The Beverly Hillbillies"; Titan Rose, a red wolf who spouts Shakespearean sonnets and pumps iron; and Stinkabod Lamé, a furry creature fond of practical jokes, slam dancing, and nude gymnastics. Their archenemy is the Mediogre, a slimy CEO obsessed with controlling the world through blandness and boredom.

The CD includes four segments: Meet the Dazzeloids, where you explore each character's good and bad sides; A Child Is Bored, in which the Dazzeloids save a boy from becoming a brainwashed zombie (as a result of too much TV); Banker Spare That Petshop, where our heroes rescue a local pet store; and Dazzeloid Dreams, a collection of often hilarious mock rock videos. Created by Rodney A.

FIVE MORE FOR THE ROAD

Here are another five CDs that, while not among the top tier, are worth a look.

Comic Book Confidential *(Voyager; 914/591-5500, 800/446-2001; $49.95 list).* An amusing documentary film about cartoonists is augmented with samples of their work.

Microsoft Dangerous Creatures *(Microsoft Corporation; 206/882-8080, 800/426-9400; $59.95 company's estimated price).* Not for the squeamish, this CD is an endlessly fascinating guide (with text, graphics, and video) to Mother Nature's less docile creations.

The Residents: Freak Show *(Voyager; 914/591-5500, 800/446-2001; $49.95 list).* Eye-popping, and groundbreaking, visuals star in this bizarre interactive exploration of a circus sideshow's inhabitants. Check out Wanda the Worm Woman.

Shoot Video Like a Pro *(Zelos Ventures; 415/788-0566, 800/345-6777; $29.95 list).* Here is an entertaining way to learn how to make videos—by looking through the viewfinder of a virtual camcorder.

QuickTime: The CD 1994 *(Sumeria; 415/904-0800, 800/478-6374; $49.95 list).* A choice, double-CD collection containing the winning video entries of the 1994 QuickTime Film Festival.

Greenblat, whose Rodney's Wonder Window was a 1993 *Macworld* Top Ten CD, Dazzeloids is campy fun—a loopy testament to imagination and creativity, and ultimately to the potential of CD-ROM as a distinct art form.

Star Trek: The Next Generation Interactive Technical Manual

Simon & Schuster Interactive
310/793-0600, 800/545-7677
$69.95 list price

Here's a case in which a CD's subject matter and its visual style are perfectly in accord. The subject is the starship *Enterprise*, the space vessel from "Star Trek: The Next Generation." As its title suggests, the CD offers an exhaustive, technical account of the ship's inner workings. I was relieved to learn, for instance, that the famous "beam me up" transporter has built-in error-checking protocols, presumably to prevent personnel from returning with only one nostril.

The developers have given this CD a futuristic, sophisticated look and feel—right down to the persistent hum that sounds as if you're traveling on a spaceship. Best of all, though, is the visual exploration of the *Enterprise*. Thanks to Apple's hot new QuickTime VR technology (see "VR: QuickTime's New Edge," *Macworld*, July 1995), you can pan 360 degrees around a room, open drawers, even check out a personal communicator (that A-shaped brooch everyone wears) from all angles. For Trekkers, this disc should provide hours of entertainment; for the rest of the world, it's a tantalizing taste of multimedia things to come.

Dazzeloids
You determine who rescues the Dazzeloids from the Mediogre by clicking on one of the three character panels. Hint: the Mediogre might not be the best man for this job.

Star Trek: The Next Generation Interactive Technical Manual
QuickTime VR lets you spin 360 degrees around the starship *Enterprise*'s main bridge. You can also click on any of the orange bars (right) for information about the bridge's environment and equipment.

Microsoft Bookshelf '94
Search the contents of seven reference books at once or click on any of the book icons (top right) for more-focused research. Pictured here is a map of France from the CD's atlas.

REFERENCE

Microsoft Bookshelf '94

Microsoft Corporation
206/882-8080, 800/426-9400
$69.95 company's estimated price

Beside his desk, Thomas Jefferson kept a revolving bookstand, upon which he laid his five most frequently consulted reference books. With Bookshelf '94, Microsoft improves on Jefferson's concept, delivering an indispensable tool that contains the entire contents of *seven* reference books—including an encyclopedia, a dictionary, a thesaurus, an atlas, an almanac, and more—all hot-linked and easily accessible within applications.

When writing a report on France, for example, you can highlight the word *Paris* in your text. Then you click on the Bookshelf icon—located on the far right of the System 7 menu bar—and choose Bookshelf Contents in the pull-down menu. On the right side of the screen, Bookshelf displays a color map of France taken from the atlas. The map is augmented with original Bookshelf multimedia material, such as a flag icon that shows the French flag and plays an audio snippet of France's national anthem when you click on it. On the left side of the screen is a lengthy list of content culled from all of the seven Bookshelf titles. The list includes everything from Ernest Hemingway's "Paris is a moveable feast" quote (from *The Columbia Dictionary of Quotations*) to the number of coffeehouses found in Paris in the year 1754 (from *The People's Chronology*). You can also search each book separately.

Bookshelf's multimedia content includes some 80,000 recorded word pronunciations, as well as photos, maps, animations, and a smattering of video. But Microsoft Bookshelf '94 is, above all, a welcome reminder of what made CD-ROM so attractive in the first place—namely, the ability to offer affordable, fast access to a wealth of information.

Microsoft Cinemania '95

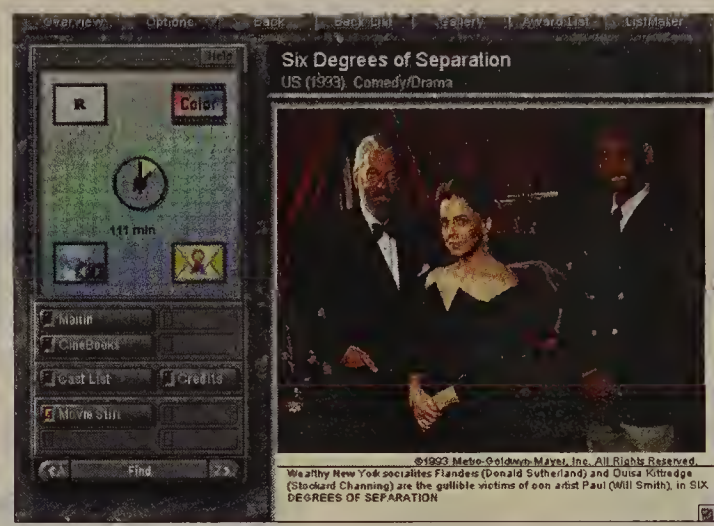
Microsoft Corporation
206/882-8080, 800/426-9400
$59.95 company's estimated price

With the entire contents of *Leonard Maltin's Movie and Video Guide*, as well as excerpts from *Roger Ebert's*

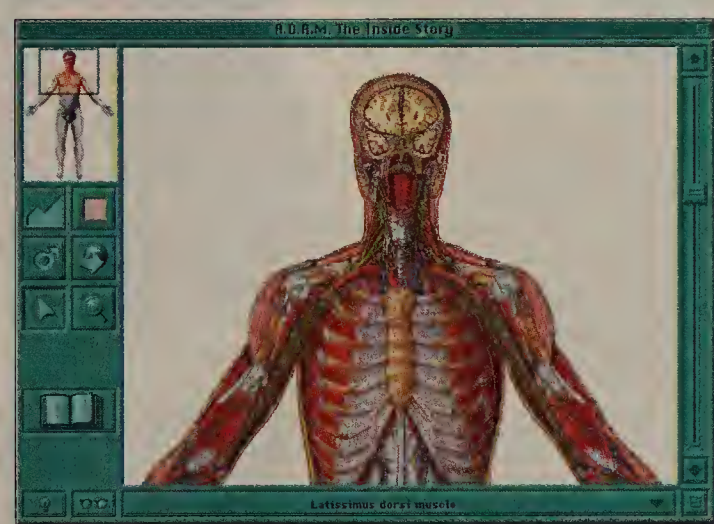
Video Companion, Pauline Kael's *5001 Nights at the Movies*, and other reference works related to movies, this is one-stop shopping for anyone whose eyes glaze over in a video store.

For aimless, easy browsing, Cinemania uses a navigational tool that resembles a VCR remote control. It's also fun to go directly to the Gallery section and wade through its rich selection of movie stills and portraits, sound-track and dialogue excerpts, and film clips. I particularly appreciate the search function, which lets you create, save, and print highly specific lists of films, such as all British comedies from the 1940s and 1950s available on laser disc (43) or all Gina Lollobrigida films with a four-star rating (zero).

New to this edition is the Cinemania Suggests feature, which gives you movie recommendations based on your mood (anyone for a screwball comedy?) or on chance (through the spin of a roulette wheel). Cinemania '95 is one CD that's as entertaining as the subject it covers.



Microsoft Cinemania '95
The main navigational buttons (left) look like a VCR remote control. The control's icons offer background on a movie; click on the sealed envelope, for instance, to find out what awards a film received.



A.D.A.M. The Inside Story
The controls (top left) let you reposition or enlarge the figure, change its color or sex, and explore it with a magnifying glass.

SCIENCE

A.D.A.M. The Inside Story
A.D.A.M. Software
404/980-0888, 800/408-2326
$49.95 list price

Anatomy has always struck me as dull. I suppose it might be helpful at cocktail parties to know that a patella is a knee bone and not an Italian bread, but otherwise, who besides a doctor would care?

The problem, I now realize, is not with anatomy but with most anatomy guides—they're about as fascinating as a frog in formaldehyde. Happily, that's not the case with A.D.A.M. The Inside Story, a lively road map of the human body.

A.D.A.M.'s nicely designed, flexible interface lets you explore the architecture of the human body in a number of ways. You can quickly locate the latissimus dorsi muscle, for instance, by choosing it from a pop-up menu. You can view the full anatomy or specific body systems (muscles, nerves, and so on) from a frontal or rear view; choose the sex and skin color of the figure; and when modesty prevails, select the fig-leaf option.

Best of all are the informative animations, which offer easy-to-understand explanations as well as some mischievous humor—an animation showing how taste buds work, for instance, climaxes with bird droppings landing on a lollipop. The disc also includes puzzles and a dictionary of terms.

Leonardo The Inventor
Leonardo da Vinci sketched ideas for musical instruments, among other things. Here you can interactively explore three instruments and find out about the Renaissance man's bell-tower invention.

Leonardo The Inventor
Future Vision Multimedia
914/426-0400, 800/472-8777
$49.95 list price

Everyone knows that Leonardo da Vinci painted the *Mona Lisa*, but until I clicked my way through Leonardo The Inventor, I had no idea he also invented the snorkel, the skin-diving suit, the helicopter, and the paddleboat, among other things. Talk about your Renaissance man.

OK, so Leonardo didn't really *invent* those things. But he did sketch conceptual designs that closely foreshadowed—and often influenced—the inventions that followed. Those designs provide the jumping-off point for this marvelously compelling CD. In Leonardo The Inventor you can, for example, don a pair of 3-D glasses (included) for a well-rounded perspective on da Vinci's cannon, tank, and other designs; watch video clips of modern-day equivalents of his inventions; play a few musical instruments; and test your Leonardo knowledge in three games. There's a 19-page biography, with selected terms hot-linked to graphics; a bibliography; a time line; and other features. This CD vividly brings its subject to life, and along with 4 Paws of Crab, it's one of the best-looking titles of the year. m

JAMES A. MARTIN, formerly editor of *Macworld's Graphics* section, writes about CD-ROM hardware and software for *Macworld, PC World,* and other publications.

No matter how fast can't outrun a power

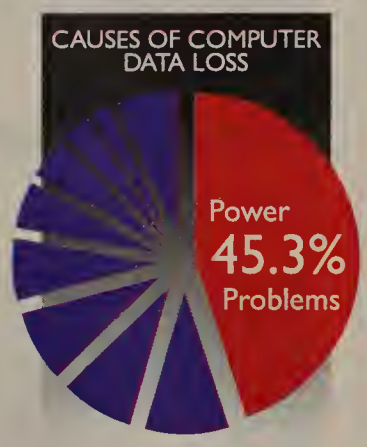
New Back-UPS: reliable power for your Mac

Just don't have the time for power problems on your Mac? Don't worry. They'll always make the time for you. It's not if a power problem will occur, but when. Due to household appliances, poor wiring, bad weather or even other office equipment, power problems are as inevitable as death and taxes. You can't run, but you can hide, behind APC protection.

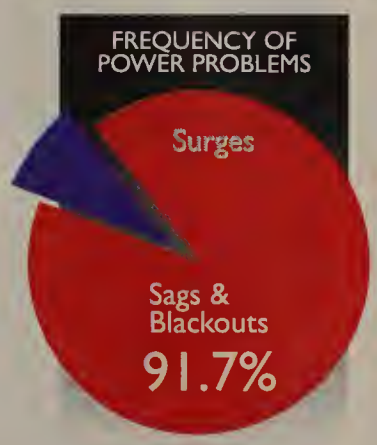
In the next three months, more than 30,000,000 PCs will be hit by power problems...

Who needs power protection? If you use a computer, you do. A study in a recent *PCWeek* showed that the largest single cause of data loss is bad power, accounting for almost as much data loss as all other causes combined. Every Mac plugged into an outlet is vulnerable. In fact, you have better odds of winning the lottery than of escaping the sting of power problems. One study found a typical computer is hit 100 times a month, causing keyboard lockups, drive damage, or worse.

Simply put, if power problems are the least of your troubles, you've got one chance to keep it that way. You insure your car and home with the best policy you can afford. It just doesn't make sense to leave your Mac (which is at far greater risk) vulnerable to loss or damage.



Source: Contingency Planning

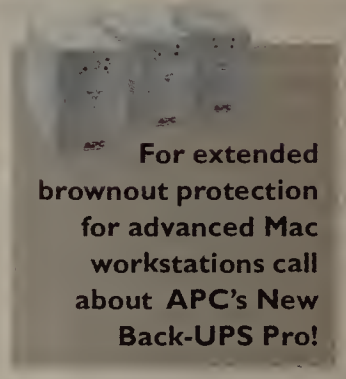


Source: Bell Laboratories

Power problems are the leading cause of computer data loss, while the most frequent type of power problems are undervoltages and blackouts, which surge suppressors alone are powerless to protect against.

Why a $119 APC UPS costs less than a $9.99 "surge protector"...

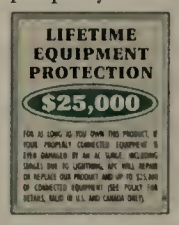
Contrary to most people's belief, a Mac alone has more protection built into it than a low-end "surge suppressor," which is usually nothing more than a well-packaged extension cord. In other words, going without protection is as good as under-spending on one of the most important computer decisions you'll make.



And since sags and blackouts represent more than 90% of power problems likely to hit your Mac, even quality, high-performance surge suppressors are literally powerless to protect your Mac from data loss.

That's why you need instantaneous battery backup power from an APC Uninterruptible Power Supply to prevent keyboard lockups, data loss, and crashes. With an APC UPS, you get six times the protection of a high-end surge protector for little more than twice the price. And $119 is much less expensive than false peace of mind.

APC UPSs carry up to a $25,000 lifetime guarantee against surge damage to your properly connected equipment, and can suit any application, from servers and PCs, to fax and satellite systems.



More than 3,000,000 satisfied customers count on APC reliability

Modern Press President Stephen Hopkins explains, "I protect my Mac Performa with a Back-UPS 400 and the unit works great. The Mac handles all bookkeeping, administrative and estimating functions for the company. It is a critical piece of my business. Unfortunately, we are located in an industrial park... a nice way of saying that our power fluctuates a great deal. After five years of reliable performance from my Back-UPS, power problems are no longer my concern. I can focus my energy on my business instead."

At Cellophane Square, Seattle's best known independent and alternative rock record store, Steve Marcus, Product Buyer, counts on APC to keep his Mac II SI and POS terminals running reliably. "The building where we started out was ancient and full of power problems. I lost lots of purchasing and product related information... until we invested in APC. I chose APC because they offer the most reliable product. I haven't been proven wrong yet. Problems continued in the building, but they were no longer a problem for us."

"We have over 30 APC units on our Macs," says Tim Girvin, principal of Tim Girvin Design, Seattle, WA. "Why do we protect every computer in the firm with an APC? As design consultants working on projects throughout the United States and Asia, 100% productivity is critical to project management. We cannot afford lost files due to power outages because of the complexity of many of the design programs we manage. Lost projects due to unprotected files is simply irresponsible. With APC in place, power problems are not even an issue, we are protected."

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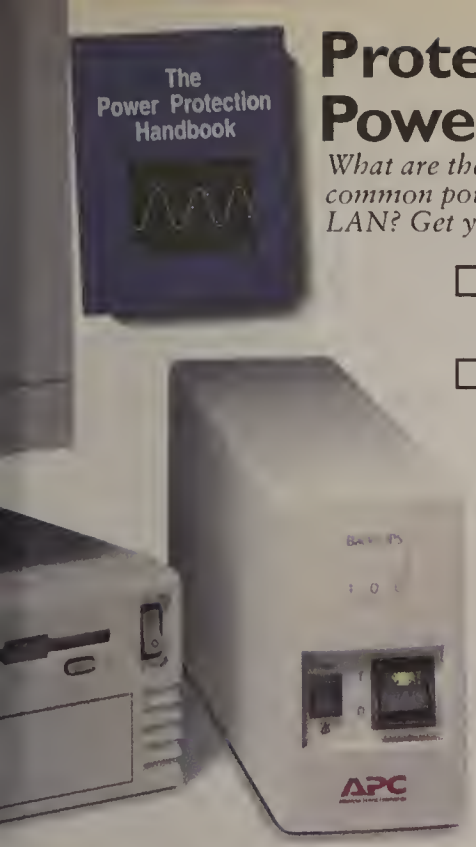

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MacWEEK *"Ultimately, it's more a question of when - and not if - you should buy a UPS... UPS power protection has never been cheaper or more convenient"*

MacUser *"If you have a server and don't have a UPS, you're playing with fire."*

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- 10 minute runtime with specified applications. For longer runtimes choose next largest unit.

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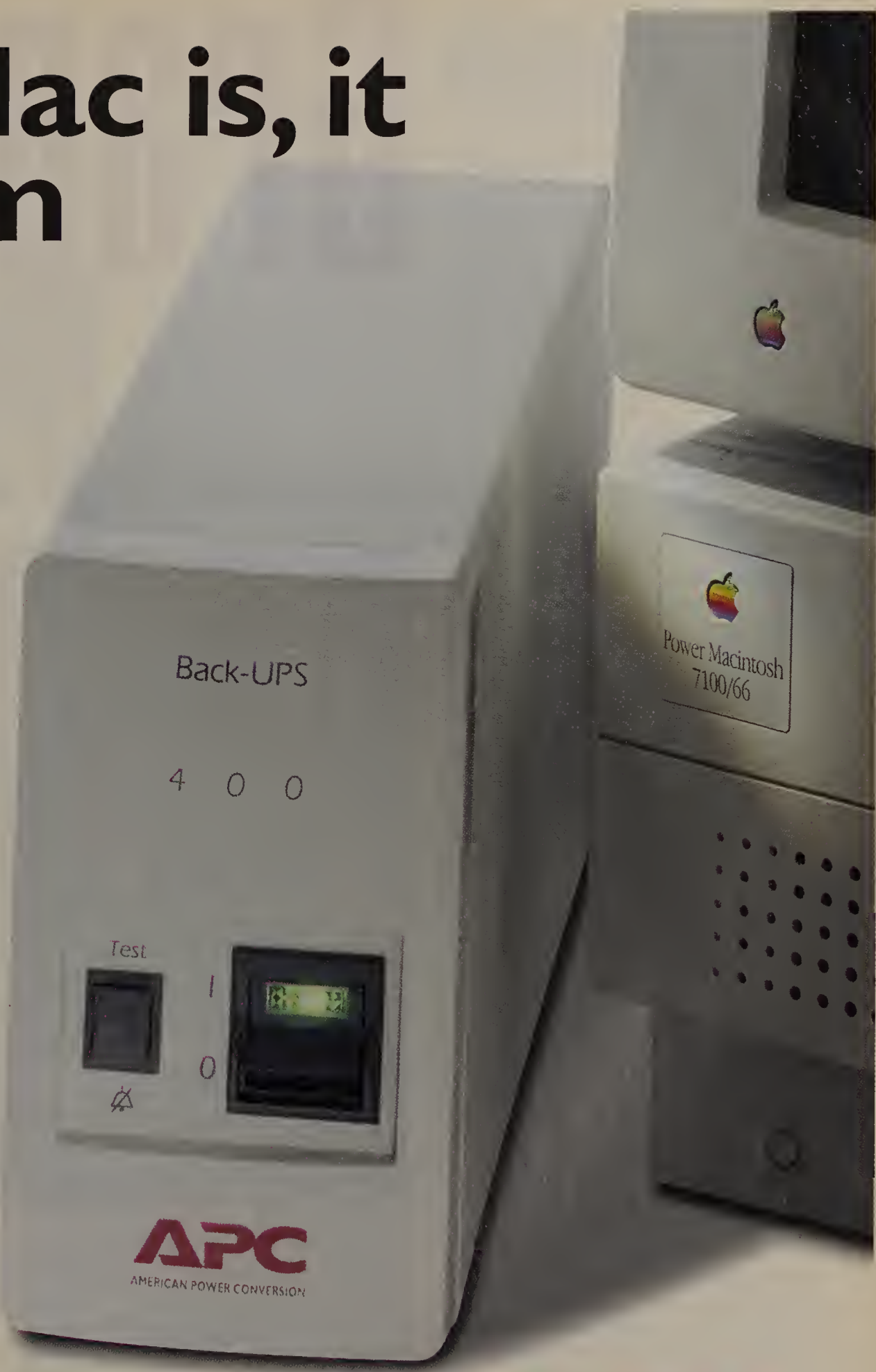
450	Quadra	$254
600	PowerMacs	$359
900	Longer runtime applications	$529
1250	Multiple systems	$689



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Circle 72 on reader service card

EDITED BY CATHY ABES

Graphics

THE LATEST IN DESIGN, PUBLISHING, AND PREPRESS

QuarkXPress 4.0 Emphasizes Workgroups, Books

ALLEN WALLACE

IT'S BEEN A FAIRLY QUIET COUPLE OF years since the last major updates of the two leading page-layout programs, QuarkXPress and Adobe PageMaker, were released. But expect the quiet to be replaced by a renewed fervor, with new releases of both programs expected before the end of the year.

In the next version of QuarkXPress, due sometime late this year, Quark (303/894-3435) will add several features that let the color-oriented page-layout program handle catalogs, books, and other documents that previous versions ignored or required third-party add-ons to manage. Although the product is still in development and the company didn't plan on revealing details so early, Quark's founder and chief technologist, Tim Gill, announced some of version 4.0's new features at the QuarkXPress Conference in San Francisco in mid-April. (So far, Adobe Systems is keeping mum about the next version of PageMaker.)

The most significant additions for producers of long documents are indexing, table-of-contents generation, and multidocument production. Competitor PageMaker has offered such features for several years, although Adobe (and its predecessor, Aldus) has not significantly updated them in some time. Instead, PageMaker's developers have aimed at matching QuarkXPress's color and design strengths. Now Quark is returning the compliment by targeting PageMaker's long-document features. These improvements could also be significant for Windows QuarkXPress users, since long-document publishing is a common activity among PC users, one supported by all mainstream PC publishing programs but QuarkXPress.

Another change that should appeal to business, catalog, and brochure designers alike is an increase in the number of allowable tab stops. QuarkXPress 4.0 will support unlimited tabs, compared with version 3.3's limit of 20.

QuarkXPress 4.0 will have character-based style sheets, so you can apply a set of attributes to selections of text, not just to entire paragraphs. This feature, pioneered by Frame Technology's FrameMaker, has been frequently requested by QuarkXPress customers.

Another set of enhancements focuses on workgroup usage, something Quark has been pushing with its Quark Publishing System, a set of publishing-management tools used by several major magazines and newspapers. While Gill would not go into detail on the workgroup features planned for QuarkXPress 4.0, he did announce several related features, including replaceable spelling and hyphenation dictionaries. (In the current version, you must use QuarkXPress's built-in dictionaries, develop custom exception dictionaries, or rely on third-party add-ons.)

Gill said QuarkXPress 4.0 will have a radically redesigned interface, although he assured users that they would not have to relearn the way they work. And for the first time, QuarkXPress will be able to save files in the previous version's format, although 4.0-specific features won't be retained. There will also be strong integration with Quark's forthcoming image editor, QuarkXPosure (see *Graphics* news, May 1995)—including the ability to import and color-separate XPosure files.

—GALEN GRUMAN WITH JAMES A. MARTIN, STEVE ROTH, AND JEFF SENNA

Drum Scans for Less

MOST DRUM SCANNERS COST FROM $30,000 to more than $35,000, placing them out of reach for most in-house graphics departments and small businesses. Meanwhile, high-resolution flatbed scanners typically cost $4000 or less but don't offer the high-resolution scanning quality many publishers require. With these considerations in mind, ScanView A/S (415/378-6360) and Mirror Technologies (612/830-1549) are hoping their new photomultiplier-tube–based drum scanners, each priced just under $20,000, will fill the void.

ROBERT PERRY

Drum scanners like the ScanMate 3000 and the Mirror DS4000 (above), each selling for about $20,000, may convince many publishers to bring high-resolution scanning in house.

According to ScanView and Mirror, their new drum scanners will reduce service bureau costs for anyone with medium to heavy scanning needs and will significantly reduce turnaround time, while still delivering high-quality images. If you send out 275 to 300 images a year to a service bureau for high-resolution scanning, for instance, you're already spending at least $20,000, as most bureaus charge $75 per scan (without a proof). What's more, a service bureau typically delivers the scan in 48 hours; a rush job is double the cost. (If you bring drum scanning in house, however, you'll need to add supplemental materials and labor costs to the drum scanner's $20,000 price tag.)

The ScanMate 3000 ($19,995), available now, is a single-pass drum scanner that captures 36-bit color images at up to 3000 dpi. However, like Mirror's DS4000 Drum Scanner ($19,900), the ScanMate 3000 automatically downsamples those images to 24-bit color. The scanner has a dynamic range of 3.6 and can digitize negatives and reflective artwork up to 8.5 by 11.5 inches, at speeds up to 1200 rpm. It can perform batch-scanning through a dedicated Adobe Photoshop plug-in (the scanner ships with another Photoshop plug-in that handles routine scanning jobs). The drum is not removable, though.

The new versions of ScanView's scanning software are available for both Power Macs and 680X0 systems. ColorQuartet RGB 3.2 ($1100) and CMYK 3.2 ($1650) let you automatically apply previous scan settings to new scan jobs, and both packages add support for SWOP, Euroscale, and TOYO color-separation tables.

The Mirror DS4000 Drum Scanner, which is made by the German firm Opto-Tech, captures 36-bit color images at up to 4000 dpi, with a dynamic range of 4. According to Mirror, the three-pass DS4000 scans negatives and reflective artwork up to 8.5 by 11.7 inches at speeds up to 1200 rpm and has a removable drum (a second drum is $1699). Mirror plans to add batch-scanning capability later this year.—JAMES A. MARTIN

Digital Pens with Ink

GIBSON

NOW YOU CAN SKETCH ON PAPER placed over a digitizer while simultaneously capturing your illustrations electronically—with one of Wacom's two new inking pens (360/750-8882). The Widebody UltraPen with Ink (UP-401) uses a ballpoint-pen cartridge and comes with three ink cartridges—red, blue, and black. Also included are two nylon tips, which you can use instead of a cartridge for strictly digital drawing. Like the original (and thinner) UltraPen, the Widebody offers 256 pressure levels and a programmable side switch.

The Widebody UltraPen with SmoothStroke (UP-421) has the same features as the UP-401 but adds a flexible pen tip that feels more like a felt tip. Both cordless pens work without batteries and are available now for $125.—C.A.

IN BRIEF

Automating 3-D Effects Besides native–Power Mac support, a wire-frame mode for faster screen redraw, and support for Illustrator 5, AddDepth 2.0 from Ray Dream (415/960-0768; price reduced to $99; upgrade $39 through August) will include the AddDepth Wizard, an interactive tutorial that either guides users through the design process or lets them choose from over a hundred 3-D graphics templates included with the program. Due in June, AddDepth 2.0 will ship on CD-ROM along with 30 display typefaces and 300 clip-art objects.

Tint, Trap, Strip, and Separate CoddBarrett Associates (401/247-2171) has released a version of its TintPrep System that runs on a NuBus Mac equipped with an Orange Micro PC card ($6995 with the OrangePC 290 NuBus card; $2995 for the proofing software only). The new version adds color and traps, strips up pages, and generates PostScript separations. It handles spot and process colors and continuous-tone images, and it provides trapping controls by object and color with on-screen proofing of traps. You can import Photoshop files into TintPrep as four-color TIFF or EPS files, and you can export files colored and trapped in TintPrep in DCS format to QuarkXPress.

xRes Gets Aggressive Fauve Software (415/543-7178), maker of the image editor that debuted at Macworld Expo last January, is making a strong bid to lure users of its competitors, Adobe Photoshop, HSC's Live Picture, and Fractal Design Painter. Through August, registered users of these programs can purchase the $799 xRes 1.1.1 for $199.

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International Attendees: International Badges (including Canadian) will be held for pick-up at the International Pre-registration counter at Bayside Expo Center. Badge pick-up hours are: August 7, 11:00 a.m. - 3:00 p.m.; August 8-10, 9:00 a.m. - 6:00 p.m.; August 11, 9:00 a.m. - 4:00 p.m. For Federal Express service, check the appropriate box on the pre-registration form and add $45 to your pre-registration fee. Fill in your exact street address (no P.O. boxes) and include your telephone number and country code. We will Federal Express your badge directly to you.

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Hyatt Regency Cambridge 575 Memorial Drive, Cambridge, MA 02139	$165/185	617-492-1234
Le Meridien Hotel 250 Franklin St., Boston, MA 02110	$215/215	617-451-1900
Lenox Hotel 710 Boylston St., Boston, MA 02116	$150/170	617-536-5300
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Hotel Accommodations

MACWORLD Expo has grown over the years and the demand for hotel rooms has grown too. With this in mind, we want to ensure your room is waiting for you. Attendees must make a *non-refundable deposit* for the first and last night at the time you make your reservation. If you are reserving 10 or more rooms, you must supply the hotel with a rooming list by June 26. Participating hotels in the Boston area are offering MACWORLD Expo discounts. To receive the preferred rate, call one of the hotels listed and mention you'll be attending MACWORLD Expo. There are only a limited number of rooms at the preferred rate and they sell-out quickly. Make your reservations by July 10 for the best selections (rates and availability cannot be guaranteed).

Services for the Physically Challenged

We're committed to ensuring that our physically challenged attendees receive all the services they need to make their visit enjoyable. We offer services such as wheelchairs and interpreters for the hearing impaired. Call us at 800-945-3313 for details.

Getting There, Once You're Here

Taking public transportation once you're in the city is highly recommended. Take the Red Line to the JFK/UMass stop, Bayside Expo will be within walking distance, or take the Red Line to South Station where you can take the free shuttle to the World Trade Center. The Complimentary MACWORLD Expo shuttle will connect you with both Expo locations.

For more information call the MACWORLD Expo Information Hotline at 800-645-EXPO, 24 hours a day, seven days a week.

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AUG. 9-10: 11:30 A.M. – 5:15 P.M.
AUG. 11: 11:30 A.M. – 2:15 P.M.

Expert Graphics

GRAPHICS PROFESSIONALS SHARE THEIR SECRETS

by Cathy Abes

Artist: Gary F. Clark is an artist who works in both traditional and digital media; a professor of art at Bloomsburg University of Pennsylvania, he also teaches both. His digital work has appeared in such publications as *Computer Artist*, *PC Today*, and *AV Video*.

How It Was Done: Clark used KPT Bryce, HSC Software's landscape-generating program, to create the central element of this fine-art piece, titled *Form, Falls, Function*. He began by opening a new Bryce file and setting the view to Top, then clicking on the Terrain Object icon to create a wire-frame grid of mountainous terrain.

After blending together two gray-scale PICT images, he merged them with the wire frame to further define the terrain. Next, in the Terrain Editor he boosted the landscape's resolution and added fractal noise.

In the Edit Palette, Clark enlarged the terrain's height, width, and depth and moved the point of view nearer ground level and closer to the mountains. Next he applied a texture to the landscape.

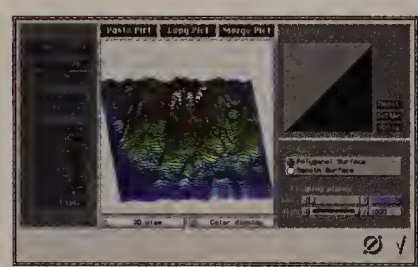
He created the sky in the Sky & Fog Palette, then rendered the scene, saving it first as a Bryce Scene and then as a PICT file for importing into Photoshop. Dissatisfied with the original sky, he generated a new one in a separate PICT file.

After importing both PICT files into Photoshop, Clark removed the original sky and pasted in the new one. To intensify the reds and oranges, he used Color Balance and Brightness/Contrast.

Bringing the landscape into Painter, he painted in the waterfall with the chalk, airbrush, liquid, and pencil variants, then added some finishing details with KPT Convolver.

Clark scanned the camera and tripod and applied Painter's water variants set to Just Add Water. In Photoshop he dropped out the midtones and pasted the image into the landscape in Luminosity mode for a transparent effect. The lenses were spherized with KPT's Lens Bright filter. m

1 Clark merged two gray-scale PICT images from the KPT Bryce CD-ROM with the original wire frame to modify its height information (the darkest areas are mapped to the lowest points, and the lightest areas are mapped to the highest points). Using Blend mode, he combined the two maps to create the third.



2 In the Terrain Editor dialog box, Clark set the landscape to the highest possible resolution, which bumped up the rendering time considerably but also provided a high degree of detail. He then applied the Fractalize command to make the terrain bumpier.

3 The terrain in wire-frame mode after Clark enlarged the terrain's height, width, and depth using the Resize Controls (Edit Palette) and used the Camera Controls to position the view nearer to ground level and closer to the mountains.

THE TOOLS

Hardware: Mac Quadra 950 with 24MB of RAM and a 400MB internal hard drive; FWB Hammer 1GB external hard drive; RasterOps 24XLTV 24-bit-color video-capture card; Apple Multiple Scan 20 Display; MDS 44MB SyQuest removable-cartridge drive; Umax UC1200SE color scanner with transparency adapter.

Software: KPT Bryce 1.0; Fractal Design Painter 3.0; Adobe Photoshop 2.5; KPT Convolver 1.0.

8 After selecting the waterfall and feathering it, Clark applied the KPT Convolver plug-in filter, using it in Tweak mode to sharpen the waterfall, and added a 3-D effect by increasing the Relief Amount.

4 In the Materials Editor, he selected Sun7 (one of the procedural textures included with Bryce), changed its Diffuse and Specular colors to a dark red and an orange, and applied it to the landscape.

5 Clark moved the Light Source Sphere so the light would shine from above and clicked on the sun icon (for daylight). He deepened the shadows by dragging inside the shadow icon.

6 The new sky Clark generated in Bryce for compositing with the landscape. After manipulating all the controls—fog, haze, clouds, shadows, amplitude, frequency, sun, and ambient light—he saved the result as a PICT file he could open in Photoshop.

7 In Painter, Clark used chalk variants set to Artist's Pastel Chalk to paint in the waterfall (top). Then he used the airbrush set to the Fat Stroke variant at 60 percent opacity to give the water a mistlike quality. Using a small brush set to liquid variants with Coarse Smeary Bristles, he painted the rest of the waterfall, adding tiny water droplets with the pencil variants set to Single Pixel Scribbler.

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At Work

THE LATEST TOOLS FOR BUSINESS COMPUTING

Apple's New Business Model

AFTER YEARS OF FRUITLESS HAMMERing at the walls of business, Apple announced on April 5 that it was reorganizing—returning to its roots in graphics, publishing, multimedia, and the SOHO and consumer markets. The shake-up has raised questions about which way the winds are blowing for the Macintosh in the corporate or enterprise market.

At first blush, the signs aren't good: the largely ineffective but high-profile Apple Business Systems division is gone, replaced by a division within a division—a marketing arm stripped of its hardware- and software-development resources. But Apple is simply changing tactics. The shift is twofold: internally, Apple has created an organization that has the potential to make more-efficient use of resources; externally, the company is looking to work more closely with strategic allies, particularly companies that can help Apple patch its tattered enterprise reputation.

JOHN RITTER

A New Look . . . Really

In the new structure, Don Strickland (previously in charge of Apple's OS licensing efforts) will be vice president of the Business and Government Markets group within the larger Worldwide Marketing and Customer Solutions division headed by Dan Eilers, senior vice president. Strickland says his group's charter is to "drive product and marketing plans to increase Apple's share in the information systems and government market, the publishing and media market, the technical and scientific market, and the mobile-computing market."

So far, some in the industry are optimistic about the company's new tack. According to Pieter Hartsook, editor of the *Hartsook Letter*, Apple's latest incarnation leverages the company's resources in a way that wasn't possible before. "Having products that work in an enterprise market is necessary for [Apple's] overall success, but it's not necessary to have a specific R&D division aimed at that," Hartsook says. He contends that the groups in the Worldwide Marketing division can concentrate on researching and selling solutions rather than on developing hardware and software. In turn, the products that come out of R&D should be less specialized, and they will have a better chance of integrating smoothly with each other.

This type of organization, with distinct marketing and engineering departments, is closer to a standard business model than Apple has been before. The marketers under Strickland may not show any more savvy about the enterprise arena than those in previous business-oriented divisions at Apple have shown, but at least they'll have fewer distractions.

Help from Their Friends

Strickland says that Apple—long known for keeping outsiders at arm's length—is now "planning to partner with ISVs, VARs, and SIs to bring better-integrated solutions to customers." While the details remain vague, some key industry players confirm that Apple seems serious. Bob King is Macintosh product manager at Attachmate, a leading vendor of host-connectivity software that gives users access to large corporate databases residing on VAXs, AS/400s, and the like. According to King, working strategically with Apple was "impossible" in previous years because the support structure didn't

exist. But King says that based on recent conversations "at the highest levels," Apple is recognizing the importance of partners that are strong in the enterprise market. "They're saying, 'Let's find someone who's good at this and partner with them.'"

Brinton Baker, senior director of marketing for Oracle's Desktop Product Division, agrees with King's assessment, saying, "Apple is now really willing to work with third parties." When asked about specific ways that Apple and Oracle might work together, Baker pointed to Apple's success in selling Performas with software bundles to the consumer market, and hinted that a similar approach might work at the enterprise level.

Try a Little Tenderness

But what about those who buy the systems—the front-line folks grinding away in the IS trenches? Strickland admits, "We need to do a better job understanding and addressing the needs of the CIO, and more generally of the information-management organizations. We will be expanding current initiatives such as the Apple Corporate Alliance, customer summits, and our ongoing relationship with the MacIS organization."

MacIS (Managing Apple Computers in Information Systems) is an association for organizations that have 100 or more Apple computers, and is considered a leading light in the enterprise market. William Monteith, executive director of MacIS, confirms that Apple has significantly increased support for his group over the past year, and he expects good things from the reorganization. "Apple has said that they're going to support us and let us be their arm to the enterprise," says Monteith.

Despite these positive signs, some feel that Apple executives are merely paying lip service to the enterprise market. "Strategic retreats are always hidden by delaying actions," says Peter Kastner, an analyst for the Aberdeen Group, the organization that produced a white paper for VITAL, Apple and DEC's all-but-defunct enterprisewide information systems architecture. According to Kastner, "Apple has lost the battle for the enterprise desktop."

Even some key Apple employees agree with this sentiment. One system software product manager recently admitted that the Macintosh probably won't displace Windows as the business standard in the United States. This may sound akin to confirming that the sun will come up in the morning, but it's in sharp contrast to Apple's heretofore stubborn insistence that every middle manager in America would eventually be reading "Welcome to Macintosh" over morning coffee.

Sour notes aside, Apple is swinging away at a market that has eluded it for years. Whether or not the company has figured out how to connect with that market remains to be seen.—C.C.

IN BRIEF

■ **OpenMind Open to Web** Version 2.0 of OpenMind, Attachmate's (206/644-4010) client-server groupware package, connects its users to the Internet. Within OpenMind's architecture, clients can browse the Web, download software with FTP, and participate in Usenet newsgroups. OpenMind now also supports HTML documents with hyperlinks to other sections of the OpenMind database. OpenMind clients now retail for $195 each.

■ **Client-Server Jam** JYACC (212/267-7722) has brought its cross-platform, client-server application-development tools to the Macintosh with JYACC Application Manager (JAM). JAM ($2000) supports DRDA and ODBC; drivers for Oracle, Sybase, and Informix are currently available (with others to follow).

■ **Now's Quick PIM Revision** Hard on the heels of its long-awaited 3.0 release of Now Contact and Now Up-to-Date, Now Software (503/274-2800) has released version 3.5 of the tag-team PIM combo ($149). Topping the list of improvements is the QuickPad, with which users can quickly create Up-to-Date notes and to-dos from any application. Now has also added a free-form comments field to Contact records, enhanced drag-and-drop support in Contact, and increased data compatibility with the Windows versions.

◀ **ArcView 2.1 Located on Power Mac** ESRI (909/793-2853) has announced that it will be bringing its popular desktop Geographic Information Services software to both the 680X0 and Power Macintoshes. ArcView helps users display, query, and analyze geographically based data, and version 2.1 includes Avenue, an object-oriented scripting language. ArcView for the Macintosh is expected to ship in July for $995.

ClarisWorks 4.0 Streamlines Tasks

IN A LAND OF BLOATED PRODUCTIVITY suites, Claris (408/727-8227) wants ClarisWorks 4.0 to be more like Muhammad Ali: float like a butterfly, sting like a bee. Toward that end, the latest version of the integrated software package features tools for oft-repeated tasks and offers tweaks to the most heavily used word processing and database modules. Claris worked to ensure that new features didn't carry program size or speed penalties.

ReadyArt Libraries, new to version 4.0, store frequently used text and graphics; users can drag and drop clips to and from documents. To further ease cumbersome tasks, ClarisWorks 4.0 comes with three new Assistants that help users create mailing labels, print certificates, and set up a home-finance spreadsheet.

ELLEN PROCHNIK

The word processing module now supports multiple headers and footers and has the ability to divide documents into sections. Express-Styles can be applied to outlines, tables, and graphics as well as to word processed text. Inveterate organizers will appreciate the fact that outlining is now treated as a style, so you can drop an outline anywhere in a document—even right in the middle of a paragraph.

Claris has added value lists to the database module so users can create fields with predefined choices; there are also new field types to take advantage of this, including radio buttons, check boxes, and pop-up menus. Users can now save database searches and sorts as custom reports, and there is an automatic, spreadsheet-like list view so that users can easily see and edit several records at once.

ClarisWorks 4.0 is available now, for a company-estimated price of $129.—C.C.

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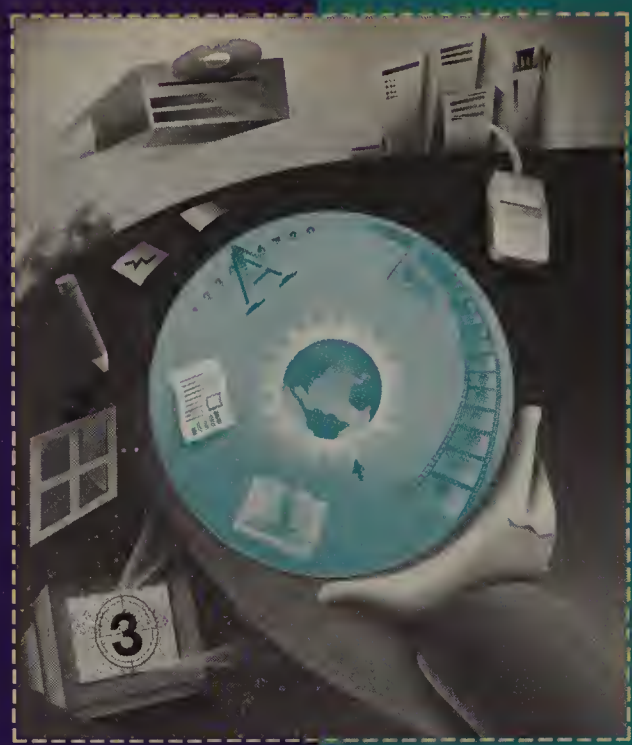

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The complete picture.

BY JIM HEID

Working Smart

Dealing with DOS Disks

IF YOUR MAC WAS BUILT AFTER AUGUST 1989, it doesn't have a floppy drive, it has a SuperDrive. This term, straight from Apple's hardworking, intercapitalizing NounFactory, refers to a floppy drive that reads not only standard 3.5-inch Mac disks, but also floppies initialized in a variety of other operating system formats—including the DOS format used in the Windows world.

In this day of SoftWindows and DOS/Windows coprocessor boards, we tend to take for granted the ability to read and write DOS disks. But initially, the only way you could access DOS disks with a SuperDrive was with the unruly Apple File Exchange utility—you couldn't actually access them in the Macintosh Finder. Soon, however, Dayna Communications shipped DOS Mounter Plus (now $95 from Software Architects, 206/487-0122), and Insignia Solutions developed AccessPC ($129, 415/335-7100), two utilities that let DOS disks appear on the Mac's desktop. Apple then showed the sincerest form of flattery by developing its PC Exchange utility, included with System 7.5.

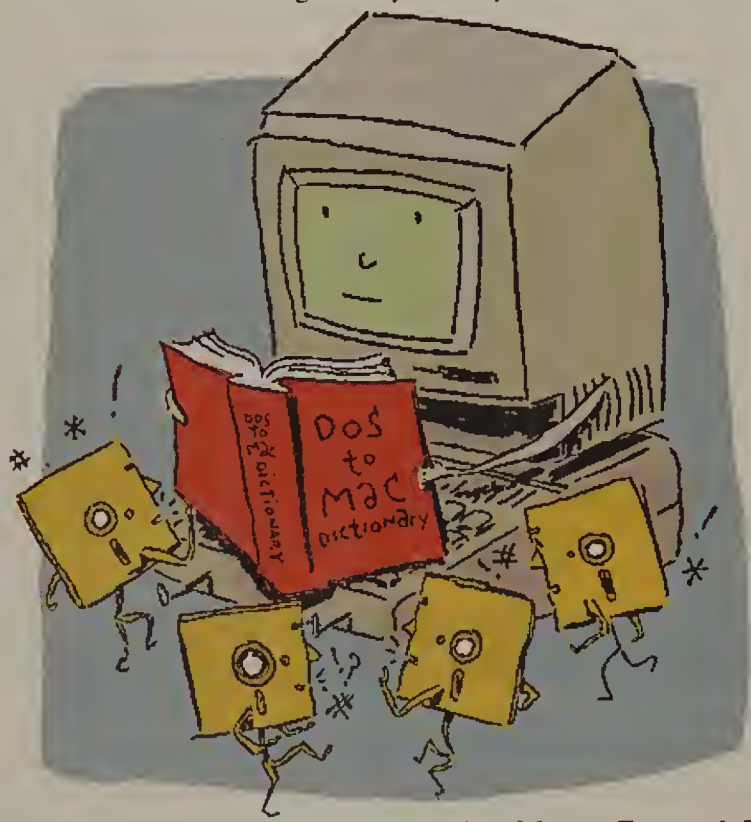
These utilities make working with DOS disks almost as easy as working with Mac disks. Better still in this era of huge files, these utilities' talents extend beyond floppy disks to encompass high-capacity removable-media devices. This month, I examine the issues and hassles behind accessing DOS media on the Mac. For details on other ways to move files between platforms, see Cary Lu's *PowerBook Notes* column in this issue.

Floppy Follies

When you insert a floppy on a Mac running AccessPC, DOS Mounter Plus, or PC Exchange, the floppy appears in the Finder as if it were a Mac disk. Files appear with icons (albeit generic ones), and subdirectories—the DOS equivalent of the Mac's folders—appear as folders. You can drag files and folders to and from the disk and also access the disk within a program's Open and Save dialog boxes.

To actually open the files on a DOS disk—or to save Mac files so a DOS machine can read them—you might need to run the file-translation gantlet. Most leading Macintosh programs have Windows equivalents that use identical document formats. For example, Microsoft Word and Excel for the Mac can swap documents with their Windows counterparts, as can WordPerfect, ClarisWorks, FileMaker Pro, Adobe Photoshop, and PageMaker.

This issue's *PowerBook Notes* describes some of the naming annoyances you'll have to contend with when moving Mac files to DOS disks, where file names are limited to eight characters plus a three-character extension (for example, BUDGETS1.DOC). A related wrinkle concerns associating a DOS file with a particular Mac program so you can open the file by simply double-clicking on its icon, instead of having to launch an appropriate program and use its Open command.



WARD SCHUMAKER

In the DOS/Windows world, a file's three-character extension allows Windows to open the right program when you double-click on the file. In the Macintosh world, this association is performed by an invisible file signature, a code embedded in the file: when you double-click on a document, the Finder checks the signature to determine which program to use to open the document.

DOS documents lack file signatures. To enable the Finder to start a program when you double-click on a DOS file, PC Exchange and similar utilities use a technique called extension mapping, which associates three-character DOS extensions with Mac file signatures. An extension map is a list of extensions and corresponding signatures that essentially tells the Finder, "When someone double-clicks on a file with the extension *WKS*, start up Excel. If the extension is *PM5*, start PageMaker. If it's *TIF*, start Photoshop." And so on.

All DOS media-access utilities let you tweak their extension maps to reflect the programs you use. This is handy if, for instance, you want the Finder to start WordPerfect instead of Word when you double-click on a file that ends in *DOC*. AccessPC comes configured with extension maps for numerous popular programs.

Format Foibles

Extension mapping is helpful, but it doesn't address the file-swapper's worst-case scenario: having a DOS document whose format can't be read directly by any program on your Mac. To help you leap this hurdle, there are file-translation utilities such as the MacLinkPlus series from DataViz (203/268-0030).

The smoothest road to file transfers involves combining MacLinkPlus/Easy Open Translators ($109), a library of file-translation modules, with Macintosh Easy

continues

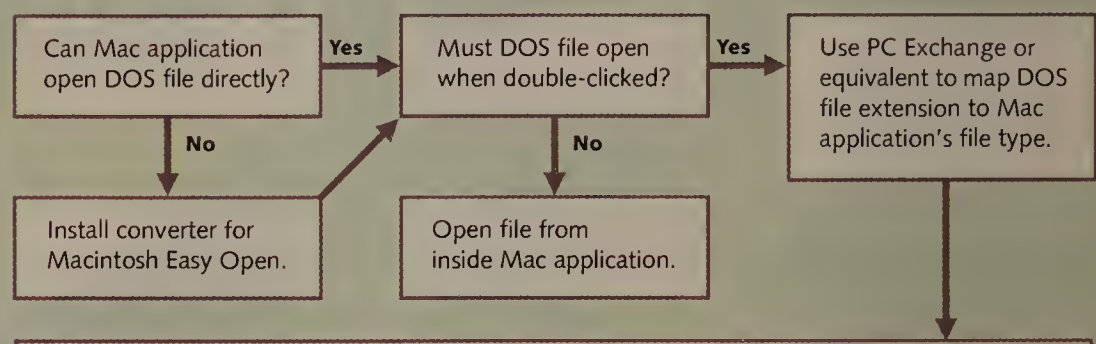
Open (MEO), an Apple extension that's included with System 7.5. MEO enables the Mac OS to ferret out a program that can read a file you're trying to open. When you double-click on a document created in an application you don't have, MEO displays a list of programs it thinks can open the file. MacLinkPlus/Easy Open Translators plugs into MEO, so when you double-click on a foreign file, MEO works together with the translators to convert the file into a format that can be opened by a program you have.

Insignia's AccessPC utility includes Macintosh Easy Open as well as a version of Mastersoft's Word for Word translators, which can convert between all popular DOS/Windows and Macintosh word processors. (Word for Word provides the largest selection of word processor translators, but no translators for other types of files.)

Most file-translation packages concentrate on text-oriented files: word processor, database, and spreadsheet documents. If you need to move graphics between programs, it's hard to beat DeBabelizer ($399) and DeBabelizer Lite ($129) from Equilibrium Technologies (415/332-4343). Both translate all major graphics file formats and even perform complex color-palette manipulation to accommodate differences in the Mac and DOS/Windows graphics architectures.

Opening DOS and Windows Files on a Mac

The Mac version of a DOS or Windows application can usually convert the application's DOS files automatically or open them without conversion. With no Mac version, you may need to install a translator from DataViz or another vendor, map the DOS file's extension to a Mac file type with PC Exchange or another utility, and configure Macintosh Easy Open to use the correct application.



To open files created by DOS apps with no Mac version (examples):

For DOS files created by	Specify this Mac app	and this file type
Lotus 1-2-3 (WK3)	Excel	TEXT
Ami Pro (SAM)	Word or WordPerfect	TEXT
dBase (DBF)	FoxPro	TEXT

More Media

Everything I've discussed so far also applies to high-capacity media such as Bernoulli and SyQuest cartridges, magneto-optical drives, and to some extent even CD-ROMs. PC Exchange, AccessPC, and DOS Mounter Plus all mount DOS-format cartridges.

To mount DOS cartridges with PC Exchange, you need version 2.0.2 or later. (Version 2.0.3 is the latest at this writing.) There's no need to install any additional software, but you do need to perform a couple of special steps. Open the PC Exchange control panel and click on Options; a list of your Mac's SCSI devices appears. Click on the entry for your cartridge drive and a check mark appears next to it; this tells the Mac to load driver software for the drive when you restart, which is your final step.

Insignia's AccessPC and Dayna's DOS Mounter Plus both include a driver file for DOS-format removable cartridges. Both utilities even let you format DOS cartridges; Apple's PC Exchange requires you to use the formatting software that came with the DOS version of the drive—that is, you must attach the drive to an Intel-based PC. AccessPC also has the unique ability to access the hard drive files created by Insignia's SoftWindows program, a utility that emulates a Windows machine on the Macintosh.

As for CD-ROMs, Apple's CD-ROM drives include an extension called Foreign File Access that, together with additional files, enables DOS-format CDs to appear on the desktop. You can access files on these CDs using the same translation tools and techniques I've described above. You can also use Windows CDs within SoftWindows, although the current version doesn't support multimedia CDs very well. A better way to run DOS multimedia titles is using Apple's Power Macintosh DOS Compatibility Card, which emulates the SoundBlaster sound-output circuitry most such titles require.

And what of those truly floppy 5.25-inch disks that were the standard back when the SuperDrive debuted? Dayna Communications (801/269-7200) still offers its DaynaFile II series of DOS floppy drives, which connect to the Mac's SCSI port and include DOS Mounter Plus. A single-drive DaynaFile II costs $525 and is available with one 360K or 1.2MB 5.25-inch drive or with one 1.4MB 3.5-inch drive (the latter might be handy if you have a pre-SuperDrive Mac). A dual-drive DaynaFile II costs $785 and is available with 360K and 1.2MB drives, with 360K and 1.4MB drives, or with 1.2MB and 1.4MB drives.

With a configuration like that, if you can't find a way to access a DOS floppy, you just aren't trying. m

Next month: Environmentally friendly computing

TIPS FOR PC EXCHANGE

- **Leave at least 5K free on a DOS disk.** The Mac needs space to store information about the appearance and position of the file and folder icons on the disk.
- **Don't delete any directories named RESOURCE.FRK.** If you work with a DOS disk on the Mac and then mount the disk on a DOS machine, you might see this directory. It contains information from the Mac-format documents.
- **Standardize on a PC Exchange Preferences file.** This file, located in the System Folder's Preferences folder, stores your extension-mapping settings. It's a good idea to give everyone in the office the same Preferences file.
- **Drag DOS-format cartridges to the Trash to eject them.** The Finder's Eject Disk command isn't available for DOS-format removable-media cartridges.
- **Eject DOS-format cartridges before turning on file sharing.** You can't turn on System 7's file sharing with a removable DOS cartridge mounted.
- **Eject DOS-format cartridges before restarting or shutting down.** Otherwise, you're likely to see a sad-Mac icon when you restart.

Contributing editor JIM HEID is the author/producer of the BMUG Choice–award-winning *Macworld Complete Mac Handbook Plus Interactive CD*, third edition (IDG Books Worldwide, 1994).

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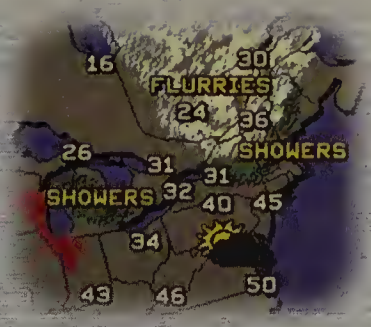

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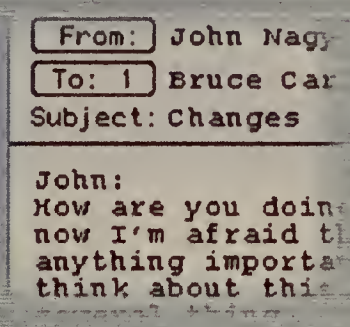

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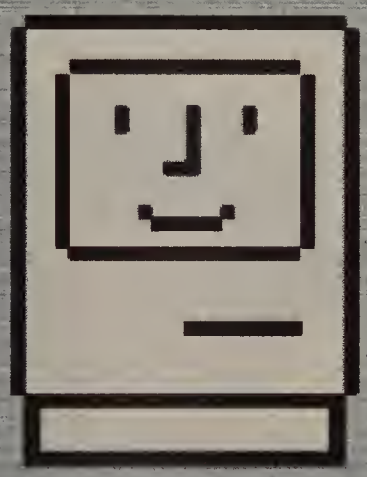

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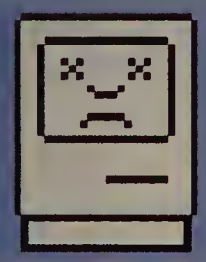

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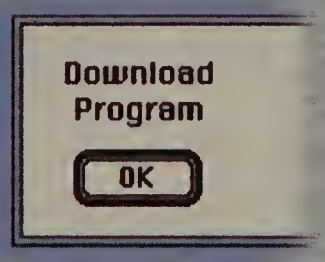
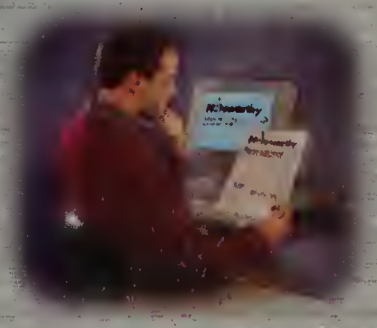


Downloadable programs.



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BY LON POOLE

Quick Tips

Tips, Tricks, and Shortcuts

IF YOU EVER NEED TO REPLACE YOUR ADB keyboard cable but can't find one at the local computer shop, William H. Waits III, of Norcross, Georgia, suggests you head to a store that sells video gear and instead buy an S-Video cable of the desired length. You can get a cable that's longer than the original, but Apple recommends that ADB cables be no longer than 5 meters. If your monitor cable needs an extension, Waits says you can use an IBM PC Joystick Extender cable, which you should be able to pick up at a computer store for about $5. The cable works with a regular display but not with Apple's AudioVision monitor, which uses a completely different type of connector.

Start-up Trouble

Q. It takes two attempts to start up my SE/30 ever since I made the mistake of upgrading it with the System 7.1.2 disks that came with my Power Mac 6100. The first start-up attempt results in a sad-Mac icon, a black screen with a beep, a flickering Welcome to Macintosh box, or some other indication of trouble. The second attempt works normally. Installing System 7.5 did not cure the problem.

Stuart C. Keen, Jr.
Nairobi, Kenya

A. Try restarting the SE/30 with a Disk Tools disk (the one that came with the computer or with System 7.5) or another start-up floppy disk. If that works properly, the computer probably has a garbled System Folder, and the surest fix is a clean installation of the system software. With System 7.5, you accomplish this by running the Installer and pressing ⌘-shift-K when the main installation window appears. With older system software, drag the System file from the System Folder to any other folder, rename the System Folder, restart from a floppy, and install. For good measure, update your hard disk driver software with Apple HD SC Setup version 7.3.2 on System 7.5's Disk Tools disk. (If you have a non-Apple hard drive, use the drive maker's latest software instead.)

If the computer won't start up after a clean install but will from a floppy, you have a hardware problem. Turn off all power, disconnect external SCSI devices, and restart. If the problem persists, try zapping the PRAM (resetting the control panel settings in the battery-powered memory) by holding down ⌘-P-R while starting up; release the keys after you hear the normal start-up sound repeat. If that doesn't work, head for the repair shop.

After confirming that the computer starts up properly, move your personal items from the old System Folder to the newly created clean one. Before moving the items, you may want to assign them a label from the Label menu so they'll be easy to locate and remove if you experience start-up trouble later. Start with the items least likely to cause start-up problems—fonts, preference files and folders, Apple-menu items, and start-up items—in one batch. Restart to make sure the added items don't cause problems. Then move your extensions and control panels, being careful not to replace clean ones with items from the old System Folder, and don't add old items to the clean System Folder unless you're sure you need them. Try doing without; you can always add them later. If start-up trouble develops after you move old items to the clean System Folder, some of those items must be conflicting with others. Find them by trial and error, or save time by using Conflict Catcher II or Now Utilities.

DOUG ROSS

Choosing a Style

Q. Is there any difference between using the bold command in a word processor and directly applying the bold version of a font? Which piece of software determines what the corresponding bold will be for a regular font?

Frederick Charette
Montreal, Quebec, Canada

A. Most companies that make fonts link the bold, italic (or oblique), bold italic (or bold oblique), and plain styles of a particular font in a family, so that choosing the plain font from an application's Font menu and a style from the Style menu has the same effect as choosing the equivalent styled font from the Font menu. Either way, the styled font is used for display and printing if it's

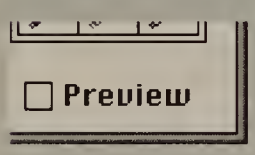
continues

HIGHLIGHT AND SHADOW DOTS

Before sending gray-scale images to a commercial printer for halftoning, you should adjust the amount of black in the brightest highlight dots and in the darkest shadow dots according to the commercial printer's guidelines. For example, a printer might recommend 2 to 3 percent black in the highlights and 90 percent in the shadows for printing with a particular press on newsprint. If you don't adjust the image, the shadows or highlights may lose detail or contrast in the printed halftone. Here's a quick-and-dirty method that Mike Rhodes, of Chandler, Arizona, has used with Photoshop versions 2.0, 2.5.1 (but not 2.5), and 3.0 to adjust as many as 30 images in half an hour.

Original Image

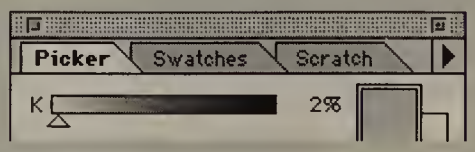
1. Open the image and show the Info and Picker palettes. In the Info palette, make sure one of the color readouts is set to Grayscale or Actual Color. Open the Levels dialog box and make sure the Preview option is off.



2. To identify the lightest areas of the image quickly, hold down the option key while clicking and holding the rightmost Input Level slider. The image goes black, but white areas (highlights) begin to appear if you option-drag the slider to the left. Look for a printable highlight area in the image—one that contains some detail—not a pure white specular highlight. For example, in this image we picked the spot of white fur on the dog's neck as a printable highlight and considered the glare on the wall behind the woman's elbow to be a specular highlight. Mentally note the position of the printable highlight area, and release the mouse button and the option key.

3. Place the eyedropper over the printable highlight you identified in step 2 and move the eyedropper around a bit while watching the K (that is, black) values in the Info palette's gray-scale readout. Click a spot whose right-hand K value is 0 percent.

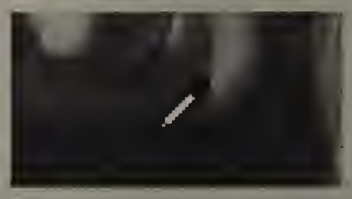
4. In the Levels dialog box, drag the rightmost Input Level slider back to the right side while watching the K value displayed in the Picker palette.

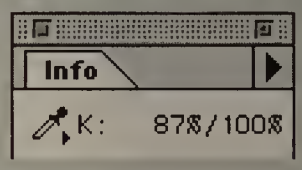


Stop dragging and release the mouse button when the K value reaches the percentage your printer specifies for highlights.

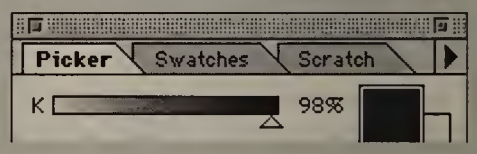
5. Identify the shadows by option-dragging the leftmost Input Level slider to the right in the Levels dialog box. Initially the image goes white, but black areas appear as you drag, revealing the shadows. Mentally note where a shadow is (in this image, we picked a spot under the woman's chin) and release the option key and mouse button.

6. While watching the K values in the Info palette's gray-scale readout, move the eyedropper around inside the shadow area that you picked in step 5. Click a spot whose righthand K value is 100 percent.





7. In the Levels dialog box, drag the leftmost Input Level slider back to the left while watching the K value in the Picker palette. Stop dragging and release the mouse button when the K value reaches the percentage your printer specifies for shadows. If you move the slider all the way to the left and the K value is still too high, you can lower it further by dragging the leftmost Output Level slider to the right.



8. Click OK in the Levels dialog box to accept the adjustments.

Final Image

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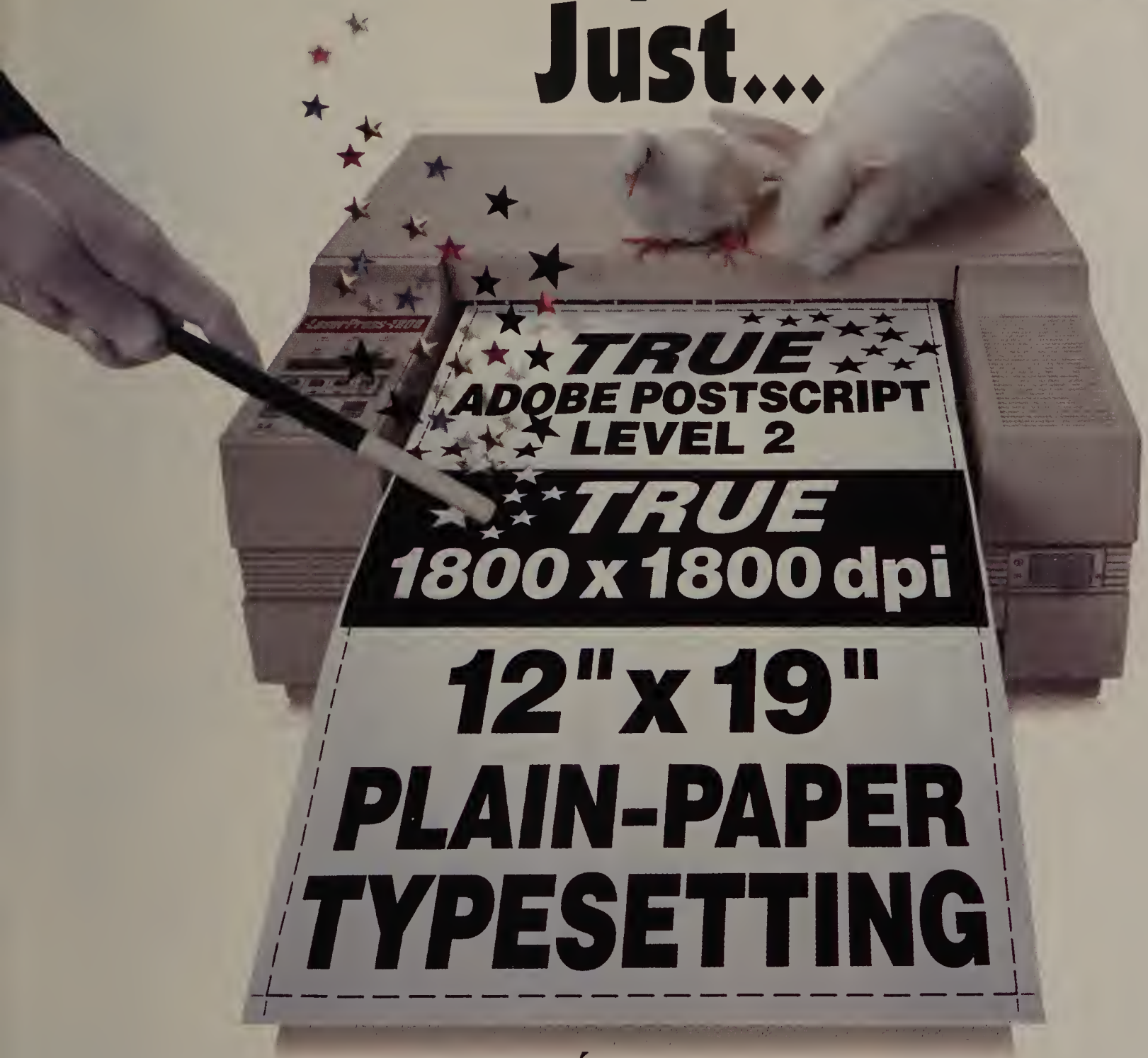

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available. If no bitmap (fixed-size) or TrueType font is available for a chosen style, the system software's Font Manager derives the style from the plain bitmap or TrueType font. If no styled PostScript font is available, a PostScript printer simply prints the plain style.

Applying a style has two advantages over choosing a styled font. For one, text styled with the Style menu will display correctly even if someone views it on a Mac that lacks the styled screen font. (Text that has been set to a styled font that's unavailable displays in the application's default font—usually Geneva.) The other advantage is that you can change the font of a large block of text without affecting scattered instances of styled text.

Additional styles beyond the basic four, such as light, extra bold, and black, can't be linked to a font family through the Styles menu. The Mac OS considers those styled fonts to be separate font families and doesn't recognize their relationship to the larger family.

Overprinting Black Type

TIP In my experience printing many PageMaker 5.0 jobs, black text doesn't always overprint a colored screen background as it's supposed to do by default. To make sure that black text always overprints, use the Define Colors command to create a new black color whose Overprint option is turned on (see "A Black That Overprints"). Then select the text and rules inside screened areas and set them to the new overprinting black.

Gisele Poirier
Kanata, Ontario, Canada

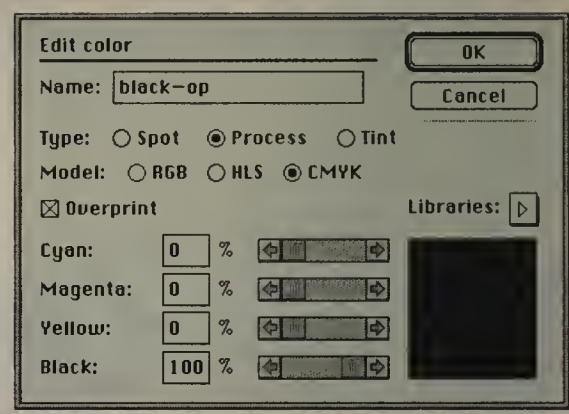
Netscape Bookmarks

TIP Rearranging the Bookmarks menu in Netscape 1.0N and 1.1B is extremely cumbersome. Moving a bookmark from the bottom of a long menu (where the Add Bookmark command puts new bookmarks by default) to the top of the menu (where you might want it for quicker access) can take a long time, because you can only move menu items one position at a time, and Netscape rebuilds the Bookmarks menu after each move.

You can make a long Bookmarks menu easier to manage and use by organizing it topically with submenus. Begin by choosing View Bookmarks from the Bookmarks menu to open the Bookmark List window. Create a new header at the bottom of the Bookmark List by selecting the last item on the list and clicking the New Header button. Begin moving the header up the list by clicking the large up arrow below the list. When the header passes an item that belongs under that header, select that item and click the up arrow to make that item subordinate to the header. If you reselect the header and move it some more, its subordinate items go with it. Moving a header with its subordinate items is much more efficient than moving each item individually.

In the future you can save yourself the work of rearranging the Bookmarks menu by adding new bookmarks exactly where you want them. Instead of choosing Add Bookmark from the Bookmarks menu, open the Bookmarks List window, highlight the item in the list after which you want the new bookmark to appear, and click the Add Bookmark button. Taking the trouble to put a new bookmark in the right spot from the start saves you a lot of tedious menu-rearranging later.

Dominik Hoffmann
via the Internet



A Black That Overprints In PageMaker 5.0, you can make sure black text overprints a colored screen background by defining a new black color, as shown in this Edit Color dialog box.

Preferences Shortcut

TIP Ever need quick access to your ClarisWorks 3.0 preferences? Just option-click the page indicator at the bottom of the document window. (If you don't see the page indicator, choose Page View from the Views menu.) This shortcut displays the Preferences dialog box with the relevant section (such as text or spreadsheet) already scrolled into view. I find this useful for turning fractional character widths on and off.

Bob Clingan
via America Online

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LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld System 7.5 Bible*, third edition (IDG Books Worldwide, 1994).

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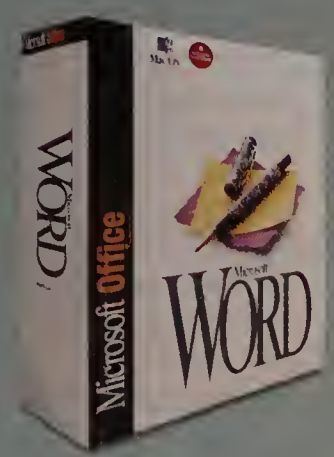

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EDITED BY ELIZABETH DOUGHERTY

Networks

THE LATEST IN CONNECTIVITY AND COMMUNICATIONS

Network Tools Change Hands

DISCOVERING THAT YOUR FAVORITE network-management software is being sold and supported by a new vendor can be disconcerting. Sometimes, however, a different owner brings a fresh perspective to the product, which translates into adding and enhancing features. That's what appears to be happening with several network-management products that changed hands recently, including GraceLAN Network Manager, which Saber Software acquired late last year; GraceLAN Server Manager, which returned to its original developer, Santorini Consulting and Design; and netOctopus, which Datawatch now sells in the United States.

FRANCISCO CACERES

• Saber Software (214/361-8086) is upgrading Saber LAN Workstation for Macintosh, which combined several GraceLAN applications—GraceLAN Network Manager, an SNMP add-on module, and Update Manager—that it purchased from TechWorks, a company that sells mostly hardware. The acquisition and the hiring of GraceLAN technical staff allowed Saber, which already marketed PC-based network-management software, to expand into the Mac market. Saber provides tech support to existing GraceLAN customers.

The version 2.0 upgrade, which should be shipping by the time you read this, features a completely redesigned version of Update Manager, a software-distribution application. A new scripting tool lets an administrator set up user access to applications and other network resources through a desktop folder; the folder and accompanying access privileges can change based on variables such as user ID, or hardware or software configuration. Saber LAN Workstation for Macintosh costs $199, plus $49 per workstation.

• Santorini (415/563-6398) has taken over the development and sale of GraceLAN Server Manager 3.0 from TechWorks. Santorini, the original developer, says it will continue upgrading and adding new features to the product, which it has renamed Santorini Server Manager. (However, existing customers should contact TechWorks for technical support.)

Server Manager lets network managers monitor and control multiple AppleShare servers simultaneously from their desks. A single-server license costs $395; five-server ($695) and ten-server ($995) licenses are also available. Server Manager comes bundled with Apple Workgroup Servers 6150/66, 8150/110, and 9150/120. Santorini has also enhanced its Server Tools, a suite of server-management utilities (one-server license $295; five-server $695).

• Datawatch (508/988-9700), which sells Virex antivirus software, recently obtained U.S. marketing rights to netOctopus, a network- and system-administration package developed by Germany-based Pole Position Software. Like Saber LAN Workstation, netOctopus can be used to distribute software electronically. Datawatch is supporting existing netOctopus customers, and the company promises a major revision of netOctopus later this year. An interim release, due in July, will allow remote users to run database updates, virus scans, software inventories, and similar functions automatically when they log on. netOctopus costs between $30 and $47 per workstation.

Tip: If you discover that software you own is being sold by a new company, contact that company so it can send you product updates and information. You can also clarify which company is supporting the product.—MARTHA STRIZICH

NSI 1.5 User Bruiser

APPLE RECENTLY SHIPPED ITS NETwork Software Installer (NSI) 1.5, which unlike previous versions doesn't support third-party Ethernet cards. NSI 1.5 works only with cards that have Ethernet media access control (MAC) addresses identifying Apple Computer as the card maker. MAC addresses are unique for each manufacturer and are burned into the LAN cards' ROMs.

Apple says already-installed third-party Ethernet cards will continue to operate using the installed driver. Now installing third-party cards that use Apple's drivers requires a user to either reinstall the driver portion of an earlier NSI release or install a third party's driver. For example, Asanté and Farallon Computing ship their own drivers with their Ethernet cards.

To determine if the NSI 1.5 driver is causing a problem, open the Network control panel. If the EtherTalk icon is highlighted, then a usable Ethernet driver is installed; if clicking on the EtherTalk icon yields an error message, you must install a driver, using either the Easy Install procedure from an earlier version of NSI (preferably NSI 1.46) or a third-party driver-installation disk.

Spokespeople for Asanté and Farallon, two of the largest third-party Macintosh Ethernet card makers, expressed frustration at Apple's policy change. "With Windows 95 coming out touting third-party product plug-and-play, and Mac users already accustomed to third-party compatibility, this seems like an odd thing for Apple to do," says Georganne Benesch, Farallon's director of network product marketing.—MEL BECKMAN

IN BRIEF

■ **Security Truce** The battle between Secure HTTP (sHTTP) and Secure Socket Layers (SSL) appears to be over. Netscape, AOL, Prodigy, EIT, IBM, RSA, and CompuServe have all agreed to let Terisa Systems (415/617-1836; E-mail **info@Terisa.com**) integrate the two security standards. Terisa's SecureWeb Client and Server development tool kits will help developers build transaction-security functions into their applications that work with both standards. (SSL support will be available in the third quarter of 1995.)

■ **ISDN Route** A switching router from Symplex (313/995-1555) connects remote Ethernet networks by building and tearing down ISDN connections as needed. The DirectRoute Remote RO-1 ($1399), which supports AppleTalk, TCP/IP, and IPX, uses spoofing to filter out protocol traffic that it can handle locally, thus reducing WAN traffic. The RO-1 has one Basic Rate ISDN 128-Kbps line. It can dial up to 12 sites; 2 sites can be connected at the same time. Each site needs a DirectRoute; in addition to the Remote RO-1, Symplex sells routers ($2999 to $7999) for 8, 64, or 160 sites.

E-Mail Options Add Up

WHILE LOTUS, MICROSOFT, AND CE Software continue to dominate the Mac E-mail market, Qualcomm, SoftArc, and Banyan offer alternatives with added features and expanded platform support.

• Qualcomm (619/587-1121) has renamed, repriced, and retooled Eudora, the most popular Internet-based E-mail client. The freeware version is now called Eudora Light. The commercial version, dubbed Eudora Pro, includes TCP/IP access software for Macintosh and Windows, as well as a built-in spelling checker, at $89 for a single-user license. (Volume pricing ranges from $357.50 for 5 users to $11,250 for 250.) Eudora Pro has Power Mac and 680X0 editions. Eudora is popular with Internet users because it supports Internet standards like MIME for multimedia E-mail. Eudora Pro owners can get the spelling checker free via anonymous FTP to **ftp.qualcomm.com**.

• SoftArc (905/415-7000) is positioning FirstClass—often thought of as BBS software—as a corporate groupware and E-mail system, and it's making inroads into this application area. SoftArc plans to ship a Windows server to complement its existing Mac server in late June. FirstClass gives users of Macs, Windows, and OS/2 access to E-mail and group conferencing. Gateways are available to connect FirstClass to the Internet via UUCP. FirstClass pricing starts at about $80 per user (plus server costs).

• BeyondMail, an E-mail and workflow package from Banyan Systems (508/898-1000), now has client software for Mac and Unix users. Macintosh users still have to connect to a PC server that's running VINES (Banyan's network operating system), but they get the full suite of BeyondMail features, including BeyondRules, a scripting language that lets users create automated document-management and workflow systems; and MailMinders, which are rule-based message-handling agents. BeyondMail uses VINES's Pricing for directory services; Banyan plans to add support for NetWare MHS soon. Pricing for BeyondMail for Macintosh starts at about $100 per user (plus server costs).—JOEL SNYDER

Internet via ARA

WHILE INTERNET SERVICE PROviders struggle to guide new users through messy SLIP and PPP connection setups, Open Door Networks (503/488-4127) in Ashland, Oregon, is using Apple Remote Access (ARA) to make getting Internet access easier.

Members' Macs become nodes on Open Door's AppleShare network by calling in with an ARA 2.0 client. Once signed on, users can browse local servers or run Internet applications on their Macs. MacTCP is required. (It ships with System 7.5, or Open Door sells it for $10.) If you agree to spend $20 a month in connect-time charges (at 10¢ per minute), Open Door will maintain an E-mail account and a Web page for you.

So far, Open Door has only a local Oregon number, so long-distance callers must pay toll charges. But the company is actively licensing the technology, so stay tuned for an ARA Internet node near you. To sign up, dial 503/482-3181 with ARA client software, and connect as a guest.
—CAMERON CROTTY

JOHN BLECK

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BY CARY LU

PowerBook Notes

In a DOS and Windows World

SINCE POWERBOOK USERS TEND TO BE mobile and often need to connect temporarily to other kinds of systems, they are more likely than desktop Macintosh users to be confronted with a DOS/Windows environment. So what's the minimum equipment you need for exchanging information with a DOS/Windows PC? The obvious answer is a floppy drive, but suppose one or both computers lack one? You may have a Duo or a PowerBook 100, or the PC may be a subnotebook without a floppy drive, or even be an older model with 5.25-inch floppy drives.

Direct Modem Connection

If both computers have a modem, you can just connect the two modems. All you need is a simple RJ-11 phone cord—the kind that connects a modem to a wall jack—and a communications program on each computer. On the PC, the Terminal program that comes with Windows 3.1 (in the Accessories program group) or HyperTerminal in Windows 95 will do. On the PowerBook, you need a communications program that supports at least the Xmodem protocol. In addition to the many commercial programs available, there are several free programs, such as Term 2.0 and FreeTerm, as well as the $30 shareware ZTerm by David Alverson.

Start both communications programs. On either computer, type **ATA** for (*answer*), and then immediately type **ADA** for (*dial*) on the other computer. After handshaking, the modems will connect. You may have to fuss with the settings; 9600 bps or slower ones work more reliably. Turn the modems off and on or restart the computers if necessary.

Once the computers are connected, you can easily exchange text files using both communications programs' send and receive text commands. To send files from either computer, you must set the same binary file-transfer protocol on both. The Windows 3.1 Terminal program supports both Xmodem and Kermit, but neither automatically creates file names on the receiving side. The Windows 95 HyperTerminal program adds several more protocols, including Zmodem, which can create file names automatically if it's on both computers. However, unless the PC runs Windows 95, you should use only short (8-character) file names. Before moving a file from a Mac to a PC, turn off MacBinary formatting on the Mac. To do this in ZTerm, for example, go to the File menu and select Transfer Convert and Binary Data. If you're sending files from a PC to a Mac, you can ignore the MacBinary settings.

Null Modem Connection

Although a direct modem connection eliminates the need for phone lines and a null modem cable (which connects two computers via serial ports without using modems), a null modem cable connection is easier to establish. The $199 MacLinkPlus/PC Connect from DataViz (203/268-0030) includes a null modem cable, connection software for the Mac and PC, and MacLinkPlus/Easy Open Translators (see *Working Smart* in this issue for details on Mac/PC file-format conversion). DataViz also sells just a Mac-to-PC null modem cable for $20.

If the two computers are in different locations, you can call one from the other using a conventional modem connection and any communications program, subject to the same file-transfer conditions already described. MacLinkPlus/PC Connect supports dial-up—but not direct modem—connections.

The E-Mail Connection

Another way to transfer data between your PowerBook and a PC is via an online service. Simply attach the file to electronic mail. Both the Mac and PC must have software for the online service and a valid account. If you don't have a separate account for each computer, you can send files to yourself. Note, however, that many systems will not let two computers with the same account connect simultaneously. File transfers by E-mail typically support only the data fork (data portion) of Mac files, which is all you usually need to send to a PC.

Networks can also transfer data; see *PowerBook Notes*, August 1993 and November 1994, for more information.

The Disk Exchange

If both the PowerBook and the PC have 3.5-inch floppy drives, the simplest way to exchange information is on disk.

System 7.5 includes the necessary software (PC Exchange) to do the floppy disk format conversion on the Mac. With the right software, a PC can read a Mac disk (high-density 1.4MB format only); the most comprehensive such program is the $149 TransferPro for Windows from Digital Instrumentation Technology (505/662-1459, 800/467-1459).

Since many nonstandard computing devices—such as dedicated word processors and instrumentation equipment—use the 3.5-inch DOS floppy format, you can exchange files with them as well. PC Exchange also reads and writes 3.5-inch floppies in the Apple II ProDOS format.

continues

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Files too large to fit on a floppy can be compressed. Three popular compression formats work on both PCs and Macs.

• LHA for DOS (by Haruyasu Yoshizaki) and MacLHA (by Kazuaki Ishizaki) are freeware available from online services and user groups. Each program can compress and expand files created by the other program.

• StuffIt Lite ($30 shareware) or StuffIt Deluxe ($129.95, Aladdin Systems, 408/761-6200) can compress and expand StuffIt files on the Mac. DOS freeware UNSTUFF.EXE can expand StuffIt files on a PC, but no program can create a compressed StuffIt file on a PC.

• ZIP: The ZIP format is an open standard supported by products from several companies and individuals. On the Mac, the $15 shareware ZipIt by Tommy Brown is the best choice. PKWare (414/354-8699), the originator of the ZIP format, sells PKZIP for DOS and OS/2 ($47 each). For Windows, try the $29 shareware WinZip from Nico Mak Computer. Ascent Solutions (513/885-2031) licenses PKZIP software from PKWare and sells PKZip Mac ($54.95), PKZip AS/400 (for IBM minicomputers), PKZip MVS (for IBM mainframes), and several Unix variants. All these programs can compress and expand ZIP files. The freeware UnZip by A. P. Maika can expand ZIP files (but can't create them) on the Mac.

One practical solution is to mix the compression formats; use StuffIt on a Mac for files to be moved to a PC, and ZIP on a PC for files to be moved to a Mac.

Large files that won't fit on one floppy must be compressed in ZIP format; only ZIP files can be segmented—split across multiple floppies—and rejoined on both the Mac (with ZipIt) and the PC. Ascent Solutions says the next version of PKZip Mac will be able to segment and join ZIP files. You cannot currently join a segmented StuffIt file on a PC.

The DOS compression programs are quite difficult to use, even for those familiar with DOS. Everything is done through a cryptic command-line switch.

Infrared Data Transfer

The Power Mac PowerBooks that are due later this summer will have an infrared transceiver that could make some of the current data-transfer methods seem old-fashioned. Several laptops and printers already have an industry-standard IrDA (Infrared Data Association) interface. Infrared-equipped computing devices constantly check for the presence of a device sending data. Two devices initially connect at 9600 bps and then negotiate a higher speed if possible; the IrDA specification calls for speeds up to 115 Kbps at a distance of 3 feet with a low-power 40-milliwatt (mw) transceiver, and up to 10 feet with a 500mw transceiver. The infrared transceivers have to be pointing at each other and protected from sunlight or bright incandescent lights. The IrDA interface does not replace networks; it is designed for point-to-point data transfer—from one computer to another or from a computer to a printer.

The IrDA interface works at the physical layer—as a replacement for cables. However, an infrared connection requires several layers of software protocols that are not yet completely standardized. As a result, the IrDA interface on many DOS/Windows laptop models can communicate only with an identical laptop model. Engineers estimate that these compatibility problems will take some 18 to 24 months to iron out.

Within the next two to three years, expect the IrDA interface to be built into more printers and other peripherals. Hewlett-Packard is already shipping its LaserJet 5p laser printer with IrDA. An infrared-equipped telephone could be controlled by a laptop, for voice and data links. A public telephone with IrDA would be especially handy; you could sit near such a phone and retrieve your E-mail. Although the Newton's infrared transceiver predates IrDA, it can communicate with IrDA equipment. For existing computers, an IrDA transceiver that connects via a serial port should be available soon for about $100. Eventually, infrared will be built into desktop computers, perhaps into monitors or keyboards because the main computer box is so often stowed under tables or in other locations awkward to reach by infrared.

Infrared works best for spontaneous connections to perform such tasks as exchanging business cards and files and printing memos, which should be easy once the protocol issues are resolved. More-sophisticated infrared systems have been proposed, including high-power diffuse infrared that works as a local-area network over an entire room, with speeds of up to 50 Mbps. Such features would use more power than is practical for laptops, although repeaters and signal amplifiers could overcome these problems. In these applications, packet radio systems offer some advantages; see *PowerBook Notes*, January 1995. And though an IrDA interface costs manufacturers only a few dollars for the components, a sophisticated infrared system could add $100 or more to the final price. **m**

CARY LU is a *Macworld* contributing editor who covers mobile- and remote-computing issues in this monthly column.

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The complete picture.

THE DESKTOP CRITIC

BY DAVID POGUE

Look, Mac—No Hands!

One man's quest to eliminate the keyboard

CAUTION: THIS ISN'T AN ORDINARY *Desktop Critic* column. Then again, this hasn't been an ordinary experience. One fine night, I was the guest at an America Online live chat session: two hours, no breaks, typing furiously, spurred to ever tenser keyboarding by the unhappy comments of people whose questions still hadn't been addressed. When I awoke the next day, my right wrist screamed in pain. I limped through the day, desperately avoiding such troublemakers as doorknobs, shirt buttons, and dental floss.

When the pain didn't subside after several days, a doctor checked me out. The diagnosis: acute tendinitis.

A repetitive strain injury? Me? It didn't make sense. I mean, I'd been typing 15 hours a day, with no breaks and not- so-hot posture, for *ten years*. Why should my wrist act up now? It wasn't like I was under unusual stress, or anything—I mean, other than buying a first house, moving to a new state, and getting married.

But the doctor had good news. "I expect you'll recover fully in several weeks. You just have to make one small change: don't use your hand."

Sure, I could change. I could slurp food through straws. I could dress in Velcro-lined jumpsuits. I could junk my piano, my pencils, and my floss.

But stop using the *Mac?* That was like telling a flutist to stop breathing for a few weeks. Alas, my new, rigid, elbow-to-finger splint sentenced me to obeying the doctor's orders. The timing stank, though; book and article deadlines loomed all around me.

Then it hit me: I could lick this thing. Hadn't the Macintosh solved all my other problems? Filled with quiet resolve, I vowed to use brains, high technology, and the invincible Macintosh to outsmart my injury. The adventure had begun.

Half-Qwerty 1.2

With my right hand out of commission, I suddenly remembered my left. If only there were some way to type all the letters of the keyboard with one hand.

There is. It's an extension called Half-Qwerty ($395; Matias, 416/749-3124). When you press the spacebar, Half-Qwerty turns the left half of the keyboard into the right half—and vice versa. For example, if you press the *W* key while the spacebar is down, the letter *O* appears. Getting your brain to flip-flop its instructions to your hands really isn't as much of a challenge as you might think. Using my left hand alone, I was soon tapping along at 25 words per minute. Better than nothing, right?

Wrong. Unfortunately, I was no smarter about taking breaks with one hand than I'd been with two. Within days, I succeeded in trashing the tendons in my *left* wrist, too. Now both hands were killing me, and both were ensplinted.

Clearly, I was going to have to eliminate the keyboard altogether. I decided to call in reinforcements.

MacTemps

OK, I couldn't type. But I could still *think*, couldn't I? I called MacTemps (800/622-8367), a national Macintosh temp agency. I asked them to send over somebody to help me write.

The young man who showed up was a model worker: friendly, Mac savvy, and even more eager to work than I was. The writing proved to be no problem—I sat just behind him, dictating; he typed, handled disks, and managed the files.

Yes, the writing went fine; the editing is where everything fell apart. "Let's scroll up," I would say. "More, more—no, not that much. OK, see that word in the first paragraph? No, down a little—over, over . . ." It drove me (and probably the MacTemp) crazy.

There were other signs that a personal typist was not going to be my long-term solution. The schedule was one: as a card-carrying workaholic, I generally don't observe nights or weekends. I couldn't abide the thought of working only during working hours. The second problem was the cost: at $25 per hour, taking bathroom, phone, and meal breaks became a stressful luxury. (Pricing varies by city and skills.) Completing my book was beginning to look like a money-losing proposition. It was time to consider higher-tech solutions.

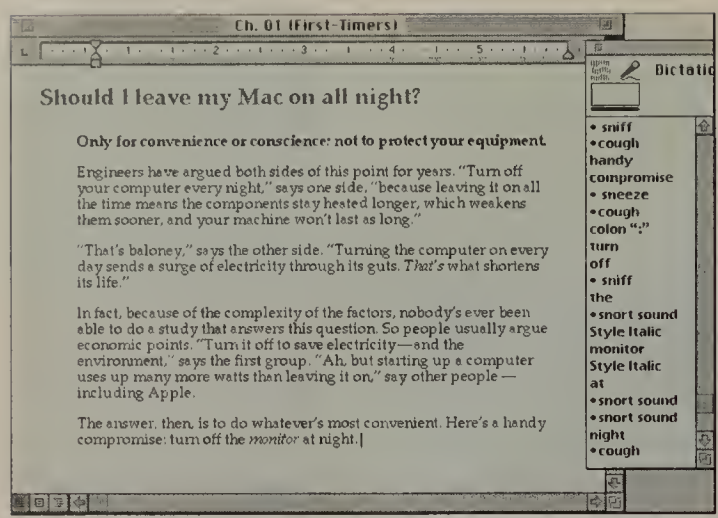
Power Secretary 2.0

By weight, Power Secretary (Articulate Systems, 617/935-5656) is probably one of the most expensive programs alive: $2495 for ten floppies and a microphone. But it actually does what it promises: it takes dictation. As you speak into the headset microphone, separating—your—words—like—this, the text magically appears in whatever program you're using (unless it's Word 5.1, which is incompatible).

This science-fictionish feat of voice recognition comes at a price, however; not just in dollars, but in disk space (15MB), memory (12MB), and equipment (16-bit sound required, provided in my Quadra's case by my $50 MediaVision sound card). There's also a considerable investment of time required. You spend one hour training the program by uttering prepared sentences; it then takes

continues

ERIC DINYER



Take a *(cough)* Letter Power Secretary logs each word you say in a word list at the right side of your screen. To prevent my coughs and sneezes from being transcribed, I recorded each as a "dummy" word (one that types nothing). That solution worked well, although it produced a fascinating written record of my flu's progress.

about a week of full-time usage before the program's dictation accuracy improves to tolerable levels.

Whenever Power Secretary gets a word wrong, you say "correct word." A tiny window instantly appears, listing the program's next nine guesses. You can select one of those choices vocally. Or, if the incorrect word was a term the program doesn't know, you can spell it out using the pilot's alphabet ("Alpha, Bravo, Charlie . . . "). Over time, after you've made enough of these corrections, you and the software come to know each other. Its accuracy—and your speed—improve dramatically. For a temporarily handless guy like me, it looked like the next few weeks might not be so unproductive after all.

There were still obstacles to utter Mac bliss, however. My noisy Manhattan environment was one. Power Secretary would thoughtfully attempt to transcribe every car horn, dog bark, or gunshot ricochet it could hear from the street, littering my writing with randomly inserted short words. Furthermore, homonyms freaked it out every time; eventually, I taught the program to distinguish, for example, *to* from *too* by pronouncing the latter in two syllables.

And Power Secretary handled only the typing. What about pointing, clicking, dragging? The doctor had said that as far as my inflamed tendons were concerned, tapping a mouse button all day was just as murderous as typing. The challenge now was to devise a means of manipulating the mouse, without a mouse.

Wacom ArtPad

My bright idea: a digitizing tablet. My brighter one: the Wacom ArtPad ($199; Wacom Technology, 360/750-8882). I had it in my head that these drawing tablets cost hundreds of dollars—but for some reason this particular model cost only $130 by mail order. It's a hard plastic board, 7 inches square. It comes with a lightweight (no batteries required), cordless pen, which I could clutch even in my splint. You simply brush the pen across the tablet to move the cursor; bearing down slightly is the same as pressing the mouse button. I especially loved the accompanying control panel; it lets you adjust the added pressure necessary to trigger a click. For the sake of my hands, I set the slider almost to zero; thereafter, it seemed that merely *thinking* about the mouse button produced an actual click.

For several days, I used miraculous software (Power Secretary) to do my typing, and terrifically engineered hardware (the ArtPad) for clicking, dragging, and operating menus. Intellectually, I believed my problem was solved.

My wrists, however, disagreed. The pain in my right hand changed somewhat, but didn't go away. I was bewildered—I mean, I was no longer typing, no longer clicking. In fact, I wasn't using my right hand for anything anymore. Except holding the Wacom pen, of course.

The pen! I cursed my foolishness. No wonder my situation wasn't improving. All day long, even when not using it, I was holding that pen, squeezing it tightly against my splint. I had replaced the occasional muscular stress of using the mouse with a full-time clenching. Clearly, my technological journey wasn't over yet.

QuicKeys 3.01

Finally, in the middle of the night, I recalled reading something in the Power Secretary manual. Something about using QuicKeys, the macro program ($119; CE Software, 515/221-1801), in conjunction with the dictation software.

Sure enough, if you teach Power Secretary the names of your macros, you can trigger them by voice. Within an hour, I had set everything up so I could launch programs, manipulate menus, and close windows by voice command. And more to the point, I created a QuicKey to generate a mouse-click whenever I spoke the words *click here*. For editing and selecting text, I also taught Power Secretary to understand utterances like *page up*, *double-click*, and *shift-click*.

At last I had achieved the seemingly impossible: I could now write, edit, and maneuver on the Mac completely hands-free. OK, not *completely;* I still used my right hand, in its splint, to nudge the mouse into position before clicking it verbally. But in general I was able to carry on happily, my hands resting at my sides. I thought I'd beaten the system.

I was wrong.

Drixoral Cold & Flu

Just as I started getting cocky, it hit me like a locomotive: a flu virus that made the one in the movie *Outbreak* look like the sniffles. I woke up one day sounding like Darth Vader with phlegm. You can probably guess the punch line: my voice-recognition software no longer recognized my voice. My attempts at writing came out looking like the raving of an incoherent madman. Even more than usual, I mean.

Fortunately, I wasn't forced to sit out the three-week ordeal this flu turned out to be. An Articulate Systems representative suggested that I duplicate my 3MB Power Secretary voice file, in which the program stores the sound of my voice. He proposed that I work with the duplicate during my illness, in effect increasing the program's understanding of the *sick* me. (When I was well again, I could switch back to my original voice file with no retraining penalty.)

Sure enough, within a day or two, Power Secretary had caught on. It adjusted its conception of my voice patterns, and the two of us got back to work.

The Upshot

I'm happy to report that, after 11 weeks, the pain in my wrists began to subside. Hand therapy helped a lot; the gradual passing of major life stresses helped too. But I'm convinced that, by allowing my hands to rest at last, my voice and macro software turned the tide and allowed my healing to begin.

At this writing, I still don't use the keyboard; I wrote this column, as I did the last several, entirely by speech dictation. By trading up to a Power Mac and a native-mode word processor, I've goosed up the speed considerably, too—I can now dictate nearly as fast as I used to type. An added bonus: while Power Secretary may get an occasional word wrong, it never makes a spelling mistake.

All of which leaves my rapidly healing hands free for more important tasks, like buttoning shirts, flipping pages, and turning doorknobs. Oh, yeah—and don't forget flossing. **m**

Contributing editor DAVID POGUE's latest book is *Mac FAQs [Frequently Asked Questions]* (IDG Books Worldwide, 1995). May this column serve as an explanation to his neighbors as to why he spends all day talking to himself.

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Buy It And Save.

CONSPICUOUS CONSUMER

BY DEBORAH BRANSCUM

Pet Peeves

Where vendors and readers go wrong

OUT IN THE MARKETPLACE, things can get ugly. And when they do, I get letters from irate readers asking for help. Over the more than six years I have been writing this column, *Macworld* has forwarded thousands of reader complaints to companies and asked officials to respond. *Macworld* acts as a neutral party; the sheer volume makes it impossible for us to investigate all complaints and judge the validity of a reader's position. Even so, this process has produced results that a majority of readers seem to find satisfactory.

After reading these complaints and the responses, I've developed a few pet peeves about vendors' behavior toward their customers—and vice versa. My advice to these sometimes warring factions may seem obvious, but it's clear from my in-basket that a few folks just don't get it. (Oh, not you, of course—those other folks.)

Advice to Vendors

1. People deserve what they've paid for. Speaking of obvious, it seems clear that if, say, Apple promises on-site warranty service to its customers, on-site service should be available. But that's not necessarily the case, according to one reader who was told she could not get her Macintosh repaired at home, despite the existence of two Apple service centers in her Columbus, Ohio, suburb.

Her complaint is small potatoes compared with that of Ron Kihara, a California Mac owner who bought a defective Apple monitor in January 1994 and returned it four times for repair. Finally Apple promised a replacement, which failed to materialize. Then Kihara was promised a refund and told the check was in the mail. Only it never arrived either. After *Macworld* contacted Apple, Kihara finally received his overdue refund—a mere 15 months later.

Many of Apple's customers are very happy with its service, and Apple is hardly the only company guilty of the occasional customer-service nightmare. Still, customers should not have to fight to get what they are owed.

2. Don't promise what you can't deliver. It's no news that software buyers often need technical support. And yet, for the past three years or so, Intuit customers have clogged online services, fax lines, and telephones complaining of their inability to get an upgrade, locate a bugfix, or find technical support as the tax deadline loomed. Complaints include promised upgrades that never appeared and significant software flaws that affected the tax returns. This annual ordeal has generated enormous resentment among some Intuit customers, an ongoing burden the company can't afford and needs to resolve once and for all.

3. Cheapskates are the norm. After I wrote about buying a new Mac (April 1995), an outraged computer salesman sent me an E-mail complaining bitterly that, in essence, cheapskates are putting companies like his out of business. Other vendors complain that some customers are horrible, while company officials are expected to be calm and professional at all times. That may not be fair, but business *is* a struggle, and nobody forcibly dragged you into this rat race. Quit whining; if you can't compete, consider taking up another line of work.

4. The market is changing. As Intel discovered last year, today's customers don't have the patience of the early computer hobbyists, who were willing to deal with unstable software or cryptic DIP switches or cumbersome installation procedures because they were so excited about the technology itself. As Microsoft discovered with the flawed Word 6.0 release, Macintosh users aren't willing to trade features for speed. People want tools that work, right out of the box, as advertised or expected. A big name won't save you if you produce junk.

5. Be nice. I'm always profoundly alarmed when a vendor calls me in response to a complaint and confides that the customer in question is a total jerk who can't be trusted and is obviously trying to ruin the business. While such conversations are rare, the owners of small companies in particular seem to have a difficult time learning not to be defensive or to feel personally attacked when they receive complaints. But professionals can't afford to get defensive, even if they believe a complaint is unwarranted or inaccurate. Thankfully, most companies understand this.

Advice to Readers

1. Don't be greedy. Recently I got a complaint from a reader who was outraged that a company refused to send him a ten-pack of SyQuest cartridges for $62 as advertised. The reader realized the advertisement was a misprint but insisted he was entitled to purchase the product as advertised because the ad had no disclaimer regarding typos. Should there have been a disclaimer? Absolutely. Is this guy being unreasonable? You bet. Companies have no obligation to go into bankruptcy just to make good on a typo.

People who buy based on price alone often get burned. I once interviewed a

continues

JOHN RITTER

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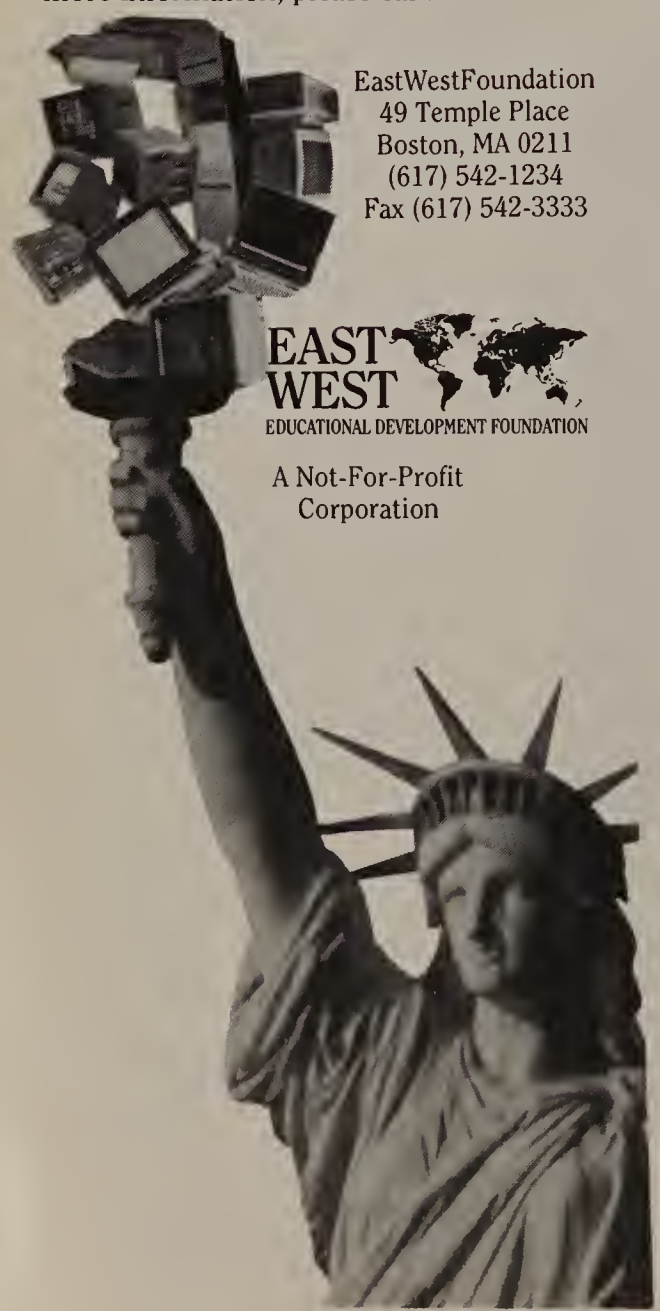

man who had taken out a large loan to launch a design business. Since money was so tight, he placed an order and mailed off a check to a small company that advertised the lowest prices imaginable. Apparently the prices were too low to sustain the company, because it went under—without sending the man his equipment. Now he has no Macintosh and a big loan to pay off. His understandable passion to save money cost him a small fortune.

2. You're on your own. Despite the many established governmental institutions that we fund with our tax dollars, you cannot expect to be rescued if you have serious problems with a vendor. A case in point: several readers who lost thousands of dollars doing business with Data Link Resources.

The Texas State Attorney General's office received copies of the complaints *Macworld* forwarded to the company, but it has not investigated the Austin-based mail-order firm, despite the sums of money involved. A spokeswoman for the attorney general says the office must concentrate its limited resources on people who cannot protect themselves, such as the elderly and children. Unfortunately, some of the readers who say they were burned by Data Link live abroad and have virtually no way to fight for refunds. Meanwhile, the company's phone has been disconnected. Buyer Beware is still an excellent motto to shop by.

3. Follow the rules. Some readers express indignation that a company will not refund a purchase returned after a 30-day or 60-day period, or that warranty service is not offered after 12 months. Companies have to establish ground rules to remain profitable. The cost for the return of a single monitor, for example, may be more than the profit a mail-order company made on the sale. While some companies may go the extra mile in accepting late returns or providing other service, you can't count on that. So make sure you return items or register your problems within the time allowed.

And whenever you're in doubt about a mail-order purchase, promptly file a dispute with your credit card company and do not pay the disputed amount until the situation has been resolved. If you've already paid, you should still register the dispute promptly. Too many readers don't file disputes within the period allowed because the nice folks on the phone from the mail-order firm claim they will fix the problem—and then they don't. By the time that's clear, it's too late to get help from the credit card company.

4. Be nice. Does it seem strange to you that companies rarely respond well to profanities, defamatory language, or threatening missives that claim *Macworld* will write an exposé of the company if it doesn't cough up a refund fast? The best way to get a favorable response is to treat the company with courtesy and respect, assuming that officials want to rectify whatever wrong you've suffered, once they understand its nature. A calmly written fax, letter, or E-mail that clearly and politely explains the problem and the resolution you expect is much more effective than angry ranting. (Ranting can be healthy—just try venting on your potted palm instead.)

5. Reward good companies. Sing their praises to the sky, copy the companies on flattering letters sent to columnists, and offer them repeat business. Companies are like laboratory mice; reward them for good behavior, and they're likely to do it again and again.

Thanks and Good-bye

Despite the annoyance of receiving a complaint from *Macworld*, most companies welcome the opportunity to resolve a dispute or explain a policy a customer may have misunderstood. During my tenure as the *Conspicuous Consumer*, very rarely has a vendor insisted that it is the target of malicious customers, or suggested that *Macworld* was a pitiful pawn being manipulated by rogue readers. True, a few threatened to cancel their advertising. But most company execs say they appreciate the service. My deepest thanks to the many fine professionals who are truly dedicated to serving their customers.

This is my last column for *Macworld*. After eight years at this magazine, I'm moving on to broaden my journalistic horizons, although I'll continue to write about computers and consumer issues. I'd like to thank my excellent editor, Marjorie Baer, as well as the support folks, copy editors, and design staff who made writing this column such a pleasure. I also owe an enormous debt to the many readers who ranted, raved, inspired, praised, and damned me. I learned something from every one. Thanks for reading, and keep those complaints coming in! Although I'm moving on, *Macworld*'s interest in your problems continues unabated. **m**

Freelance writer and editor DEBORAH BRANSCUM heads Red Pencil Productions in Emeryville, California. You can write to her at **branscum@aol.com**.

You can write to *Macworld*'s *Conspicuous Consumer* department at *Macworld*, 501 Second St., San Francisco, CA 94107. Send us your nominees for sainthood, to *Service Heroes*, or drop us a line if a company is ignoring you.

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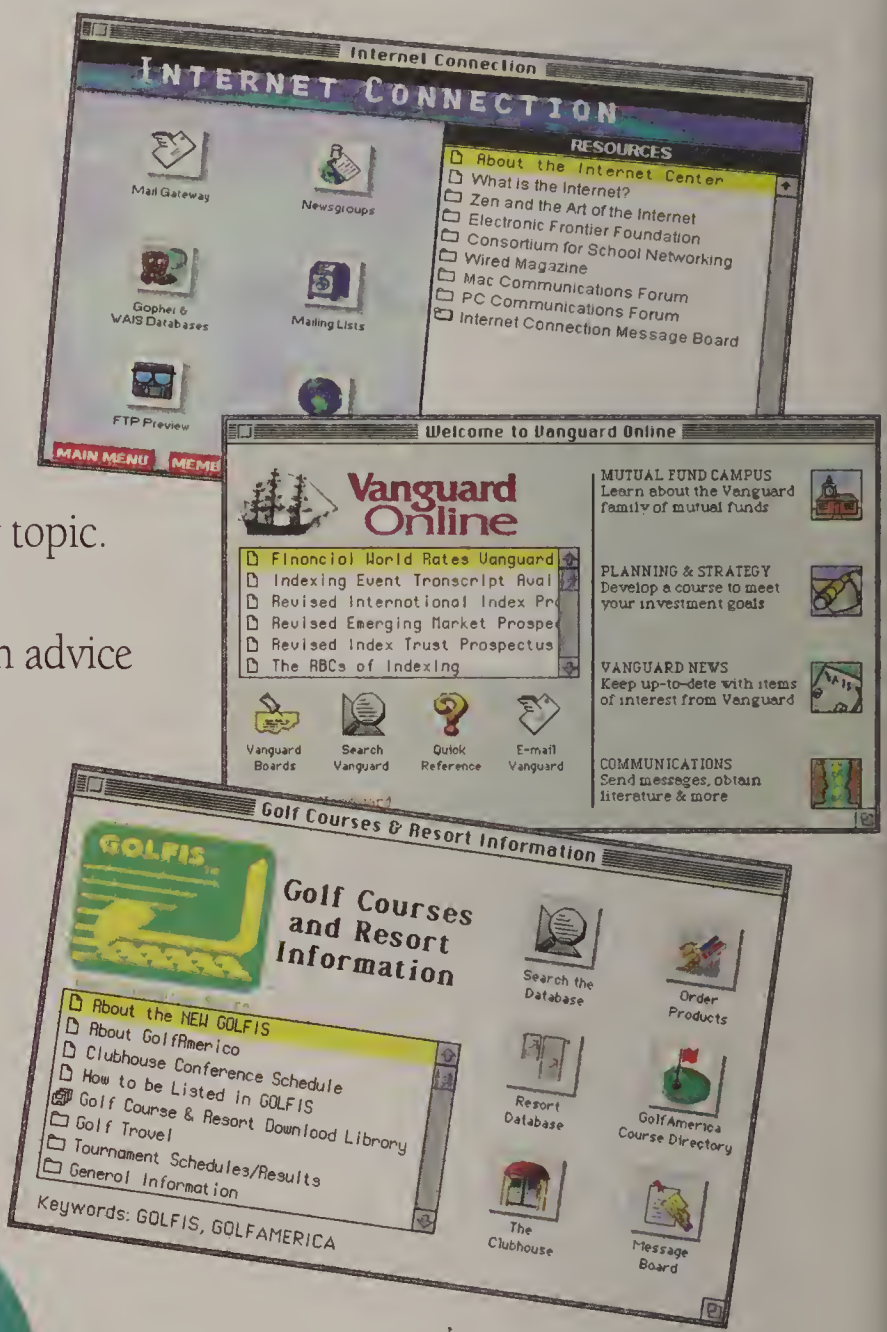

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Editors' Choice

THE BEST PRODUCTS FEATURED IN MACWORLD

Edited by Patricia Carberry-Harris

Macworld Editors' Choice is a complete listing of the hardware and software products selected as the best of their type in *Macworld*'s comparative articles. A ✣ next to a product indicates that we chose more than one product in that category. A ◀ next to a product listing indicates that a native Power Mac version is available.

Hardware

MONITORS

SMALL COLOR MONITORS, Jan 94
14-inch display: ✣ Sony CPD 1430; Sony Corp. of America, 800/222-7669; $779.95.
✣ Nanao FlexScan F340i•W; Nanao USA, 800/800-5202; $799.
15-inch display: NEC MultiSync 4FGe; NEC Technologies, 708/860-9500; company's estimated price $755.

TWO-PAGE COLOR MONITORS, Nov 94
PressView 21 Display System; SuperMac Technology, 408/541-6100; $3999.

NETWORK HARDWARE

REMOTE-ACCESS SERVERS, Oct 94
Mixed networks: NetConnect Remote Access Server; Asanté Technologies, 408/435-8401; $3899 for eight ports.
AppleTalk networks: ARA Multiport Server; Apple Computer, 408/996-1010; four ports $1799, eight ports $3298.

PRESENTATION HARDWARE

PORTABLE PRESENTERS, Jan 95
Z115; nView, 804/873-1354; $5495.

PRINTERS

COLOR PRINTERS, Aug 94
Low-end ink-jet: DeskWriter 560C; Hewlett-Packard, 800/752-0900; $719.
Solid ink-jet: Phaser 300i; Tektronix, 503/682-7377; $9995.
Thermal-wax transfer and color laser: Phaser 220i; Tektronix, 503/682-7377; $5995.

DYE-SUBLIMATION PRINTERS, Jul 94
Prepress proofing—tabloid size/fastest: Phaser 480; Tektronix, 503/682-7377; $14,995.
Prepress proofing—tabloid size/most complete: Rainbow; 3M, 612/733-1110; company's estimated price $20,000.
Prepress proofing—letter size: ProofPositive Full Page; SuperMac Technology, 408/541-6100; $7999.
General publishing and business: Phaser IISDX; Tektronix, 503/682-7377; $9995.

PERSONAL PRINTERS, Sep 94
Ink-Jet: DeskWriter 520; Hewlett-Packard, 800/752-0900; $365.
Laser—$1000 to $1600: microLaser Pro 600; Texas Instruments, 214/995-6611; $1599.

WORKGROUP PRINTERS, Jun 95
Tabloid-size printers: LaserJet 4MV; Hewlett-Packard, 208/323-2551; $3549.
Legal-size printers: ✣ Optra Lx; Lexmark, 606/232-2000; $3298.
✣ LaserWriter 16/600 PS; Apple Computer, 408/996-1010; company's estimated price $2299.

SCANNERS/IMAGE CAPTURE

ELECTRONIC CAMERAS, Sep 94
Apple QuickTake 100; Apple Computer, 408/996-1010; $749. ◀

HIGH-BIT FLATBED COLOR SCANNERS, Mar 95
✣ Arcus II; Agfa, 508/658-5600; $3495.
✣ PowerLook; Umax, 510/651-8883; $3495.

LOW-COST COLOR SCANNERS, Nov 93
$1300 to $1600: ✣ La Cie Silverscanner II; La Cie, 503/520-9000; $1599. ✣ Hewlett-Packard ScanJet IIc; Hewlett-Packard, 800/752-0900; $1599.
Under $1300: Mirror 800 Plus Color Scanner; Mirror Technologies, 612/633-4550; $1299.

OCR, Nov 93
OmniPage Professional; Caere Corp., 408/395-7000; $995. ◀

SYSTEMS/STORAGE

1.3GB OPTICAL STORAGE, Dec 94
Best low-cost solution: 1.3Gig MO; Club Mac, 714/768-8130; $2099.
Best overall performance: Genesis 1300; Microtech, 203/468-6223; $2899.

HIGH-PERFORMANCE DRIVE SYSTEMS, Jul 95
Accelerator card: SiliconExpress IV; Atto Technology, 716/691-1999; $995.
Drive mechanism: IBM UltraStar series; IBM (available from several resellers), prices vary by reseller.

QUAD-SPEED CD-ROM DRIVES, Jun 95
APS T3501; APS Technologies, 816/483-6100; $299.95.

HIGH-SPEED HARD DRIVES, Aug 93
2.7GB drives: ✣ Nova XL 2700; Microtech, 203/468-6223; $2999. ✣ Vista 3.5GB; Relax, 510/471-6112; $3499.
SCSI-2 adapter: QuickSCSI; PLI, 800/288-8754; $499.

PC COPROCESSING, Oct 94
OrangePC Model 210; Orange Micro, 714/779-2772; $1283.

RAID STORAGE SYSTEMS, Apr 95
RAID 3 or 5: MR/5 RAID; MegaDrive Systems, 310/247-0006; $18,840.
RAID 0: ✣ Joule RAID; La Cie, 503/520-9000; $2999. ✣ DisKovery 8200W; Optima Technology, 714/476-0515; $7790. ✣ SledgeHammer 2000FMF; FW8, 415/474-8055; $2359.

SYSTEM UPGRADES, Feb 95
Upgrade for Macintosh Quadra 650, 800, or 950: Power Macintosh Upgrade Card; Apple Computer, 408/996-1010; $699.
Upgrade for other 680X0 Macs: Replace with Power Macintosh 6100/60 with CPU booster and cache card. Power Macintosh 6100/60; Apple Computer, 408/996-1010; $1819 (base system with 8MB of RAM). PowerClip (CPU booster); Newer Technology, 316/685-4904; $245. 256K cache card; various companies, roughly $200.

VIDEO/DISPLAY

24-BIT VIDEO CARDS, Apr 94
Inexpensive acceleration: PrecisionColorPro 24XP; Radius, 408/434-1010; $599.
Full-featured acceleration: Thunder II GX•1360; SuperMac Technology, 408/541-6100; $4499.

DIGITAL-VIDEO BOARDS, Aug 95
SpigotPower AV; Radius, 408/434-1010; $999.

HIGH-END VIDEO EDITING, Jun 94
Presentation video: ✣ MoviePak2 Pro Suite; RasterOps, 801/785-5750; $4199. ✣ VideoVision Studio; Radius, 408/434-1010; $4499.
Corporate video (offline): Media Composer 400s; Avid Technology, 508/640-6789; $14,995.
Corporate video (online): VideoCube; ImMix, 916/272-9800; $40,500.

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MACWORLD Editors' Choice

PHOTOSHOP ACCELERATORS, Apr 94
PhotoBooster; Radius, 408/434-1010; $999.

Software

ACCOUNTING/FINANCE

GROWING A SMALL BUSINESS, Nov 93
Small-business system: M.Y.O.B.; Best Ware, 201/586-2200; $199.
Home office/personal finance: MacMoney; Survivor Software, 310/410-9527; $119.95.

BUSINESS TOOLS

PORTABLE-DOCUMENT SOFTWARE, Apr 95
Document Distribution: Common Ground 1.1; No Hands Software, 415/802-5800; $189.95.

STATISTICS, Oct 93
Exploratory data analysis: DataDesk 4.1; Data Description, 607/257-1000; $595.
Comprehensive package: SYSTAT 5.2.1; SYSTAT, 708/864-5670; $895.

COMMUNICATIONS/NETWORKS

COMMUNICATIONS SOFTWARE, Aug 94
Basic connectivity: ZTerm; David P. Alverson (no phone number available); $30.
Terminal emulation: Crosstalk for Macintosh; Digital Communications Associates, 404/442-4000; $195.
Internet exploration: VersaTerm; Synergy Software, 215/779-0522; $125.

DOS WINDOWS EMULATION, Oct 94
Timbuktu Pro 1.0.3 for Macintosh, Timbuktu 1.1 for Windows; Farallon Computing, 510/814-5000; $199 each.

NETWARE CONNECTIVITY, Sep 93
NetWare for Macintosh; Novell, 801/429-7000; $495 for 5-user license to $2295 for 200-user license.

PROTOCOL ANALYZERS, Jul 94
EtherPeek, AG Group, 510/937-7900; $795.

TERMINAL EMULATOR, Oct 93
VersaTerm; Synergy Software, 215/779-0522; $149.

GRAPHICS

3-D MODELING, Dec 94
Stand-alone modeler: formZ; autodessys, 614/488-9777; $1495.
Integrated-modeling package: Strata StudioPro; Strata, 801/628-5218; $1495.
Entry-level modeler: Infini-D; Specular International, 413/253-3100; $695.

CLIP ART'S GREATEST HITS, Jan 94
Overall collection: ✣ ClickArt Studio Series; T/Maker Company, 415/962-0195; $99.95 per volume.
✣ Electronic Clipper subscription service; Dynamic Graphics, 800/255-8800; $67.50 per month.
✣ Images with Impact series; 3G Graphics, 800/456-0234; $99.95 to $129.95 per volume, CD-ROM $499.
✣ Metro ImageBase Electronic Clip Art; Metro ImageBase, 800/525-1552; $74.95 per volume, CD-ROM $149.95.
✣ Typographers' Ornaments; Underground Grammarian, 609/589-6477; $25 per volume; ten TIFF albums $200; EPS volumes $50 each.

DRAW PROGRAMS (LOW-COST), Sep 93
Budget draw: Expert Draw; Expert Software, 305/567-9990; $49.95.
Budget draw/paint: UltraPaint; Deneba Software, 305/596-5644; $79.
Beginners' program: Aldus SuperPaint; Aldus Consumer Division, 619/558-6000; $149.95.
Overall: Canvas; Deneba Software, 305/596-5644; $399.

FONT BUYERS' GUIDE, Mar 94
Text-face collection: Type On Call CD-ROM; Adobe Systems, 415/961-4400; $99 (this price includes the ability to unlock two families from preselected packages); an additional $25 enables you to unlock individual faces, or $69 to $179 for unlocking families.
Display/decorative-face collection: Fontek; Letraset, 201/845-6100; $39.95 per face.
Bargain collection: Monotype ValuePack; Monotype, 312/855-1440; $89 for 57 fonts.

IMAGE DATABASES, Oct 93
✣ Aldus Fetch 1.0; Adobe Systems, 206/628-5739; $295.
✣ Multi-Ad Search 2.0; Multi-Ad Services, 309/692-1530; $249.

IMAGE EDITORS, Feb 95
Adobe Photoshop 3.0; Adobe Systems, 415/961-4400; $895.

INTEGRATED SOFTWARE

INTEGRATED SOFTWARE, Feb 94
ClarisWorks; Claris Corporation, 408/727-8227; $299.

ONLINE SERVICES

ONLINE SERVICES, Aug 94
E-mail: America Online; America Online, 703/893-6288; basic monthly fee $9.95.
Reference: CompuServe; CompuServe Information Service, 614/457-0802; basic monthly fee $8.95.

ORGANIZATION/PRODUCTIVITY

GRAPHING SOFTWARE, Aug 94
DeltaGraph Pro 3 3.0.4; DeltaPoint, 408/648-4000; $195.

SALES-AUTOMATION SOFTWARE, Oct 93
✣ Contact Ease; WestWare, 619/274-5053; one user $395, five users $1495.
✣ CBS; Colleague Business Software, 512/345-9964; $495.

TEXT-RETRIEVAL SOFTWARE, Dec 93
Small system: On Location; On Technology, 617/374-1400; $129.
Multiuser system: Personal Librarian; Personal Library Software, 301/990-1155; $995.

PRESENTATION TOOLS

PRESENTATION SOFTWARE, Jul 94
Persuasion 3.0; Adobe Systems, 206/622-5500; $495.

UTILITIES

BRAVE NEW DOCUMENTS, Jan 94
Application-independent document distribution: Common Ground; No Hands Software, 800/598-3821; $189.95.
Book-length documents: FrameReader; Frame Technology, 800/843-7263; $84.95.

PRINTING, Sep 93
PC-printer cable packages: PowerPrint; GDT Softworks, 604/291-9121; $149.

VIRUS KILLERS, Jul 94
Commercial software: Virex; Datawatch, 919/549-0711; $99.95.
Free software: Disinfectant; free from various online services.

VIRTUAL MEMORY SOFTWARE

VIRTUAL MEMORY, Jun 94
Virtual memory software: Virtual 3.0; Connectix Corp., 415/571-5100; $99.
Memory-boosting software: RAM Doubler 1.0.1; Connectix Corp., 415/571-5100; $99.

WORD PROCESSORS

HIGH-END WORD PROCESSOR (for fast 68040 Macs and Power Macs), Mar 95
Microsoft Word 6.0; Microsoft Corporation, 206/882-8080; $325.

LOW-COST WORD PROCESSOR, Mar 95
MacWrite Pro; Claris Corporation, 408/727-8227; $99.

Vendors: Please write to *Macworld Editors' Choice*, 501 Second St., San Francisco, CA 94107, or send a fax to 415/442-0766 to inform us of changes in your phone number or your product's list price.

Star Ratings

HARDWARE AND SOFTWARE REVIEWS AT A GLANCE

Edited by Wendy Sharp

Macworld Star Ratings lets you compare Macintosh products by providing summaries of *Macworld*'s authoritative product reviews from the past year. The number of stars indicates quality; our reviewers assign five stars to outstanding products and one star to poor ones. The ◀ symbol indicates that a product is available in a native Power Mac version.

If a product has been upgraded since our last review, the most recent version number supplied by the vendor appears in parentheses after the reviewed version number. To read a full review of any product in the listing, please consult the issue listed at the end of each synopsis.

Vendors: Please write to *Macworld Star Ratings*, 501 Second St., San Francisco, CA 9410 to inform us of changes in the version number or list price of your product, or of changes to your phone number.

Software

BUSINESS TOOLS

★★★ **AccuZip6 1.8.7, Software Publishers, 800/233-0555, $689.** Bulk-mail software has informative progress indicators, batch and individual processing, low rates, and flexible parsing during import, but the interface is incomprehensible. Sep 94

★★ **Adobe Acrobat 2.0, Adobe Systems, 415/961-4400, $195.** The font fidelity of this portable-document software is uneven, and the software demands too much in resources compared with other options. Mar 95

★★★ **Adobe Acrobat for Workgroups 2.0, Adobe Systems, 415/961-4400, $1595.** As a collaboration tool, this software is inexpensive and offers well-done annotation tools. However, it's resource-intensive, and creating hypertext documents with it isn't easy. Mar 95

★★★★ **BizPlan Builder 5.0, Jian, 415/254-5600, $129.** To create a comprehensive business plan, just fill in the blanks in this easy-to-use spreadsheet/word processor template. Jun 95

★★ **Bulk Mailer CASS 1.00d (1.3), Satori Software, 206/443-0765, $150.** Unattended operation is possible with this bulk-mail software, but batch processing is slow and the program has coding problems. Sep 94

★★★ **Business Plan Writer 6.0, Graphite Software, 301/984-1100, $99.** This proposal-writing template can help entrepreneurs create a detailed business plan, but—unlike the competition—it won't help them format an attractive presentation. Jun 95

★★★ **CA-Cricket Graph III 1.52 (1.53), Computer Associates International, 516/342-5224, $129.** Graphing software's features are just right for charts in the physical and social sciences, but lack pizzazz. The program is easy to learn and use, and includes math features for data transformations and curve fitting. Dec 94 ◀

★★★★ **ClarisWorks 3.0, Claris Corp., 408/727-8227, $129.** Inexpensive, easy to use, and powerful integrated software is the best package available. It's far better in terms of features, speed, integration, and use of system resources than its competition. Feb 95 ◀

★★★★ **Crystal Ball 3.0 (3.0.1), Decisioneering, 303/449-5177, $295.** Compact business-simulation software is fast enough for complex projects and can pay for itself in disaster-avoidance in a variety of business tasks. Oct 94

★★★★ **Decision Analysis 2.5, TreeAge, 617/536-2128, $379.** Decision-assistance software handles complex business cases by constructing tree diagrams of probabilities and payoffs. It offers a type of modeling that is easy to modify. Nov 94 ◀

★★★ **Extend+BPR 3.0 (3.1), Imagine That, 408/365-0305, $990.** Business-modeling software includes superior templates for business-process reengineering, but some programming experience is helpful. Oct 94

★★★ **InfoDepot 2.0 (2.3), Chena Software, 610/770-1210, $295.** Project planning program includes tools for brainstorming and organizing ideas; scheduling project steps; and entering, calculating, and presenting data. It does a good job but has some flaws. Jan 95

★★★★ **MarcoPolo 3.0, Mainstay, 805/484-9400, $895.** Full-featured document-management system is significantly improved. The addition of OCR—both the handling of unrecognized words and the ability to batch-process TIFF files with OCR—make it very usable. Jan 95

★★★ **MicMac 2.0v1, Nirvana Research, 408/369-1200, $89.** The concept of Mac as dictation machine is undeniably attractive, and Nirvana Research has pulled it off well. It takes lots of hard drive space to save recordings, though. Nov 94

★★★★ **Microsoft Excel 5.0, Microsoft Corp., 206/882-8080, $339.** Although the feature set of this Power Mac spreadsheet is stunningly rich, the system requirements for a full install are jaw-dropping, including 27MB of hard drive space plus 24MB of RAM without virtual memory. Still, it is relentlessly complete. Jan 95 ◀

★★★ **Microsoft Works 4.0, Microsoft Corp., 206/882-8080, $99.95.** Although this isn't the best integrated package around, it's a sensible, low-cost choice. It offers a respectable word processor, database, spreadsheet, calendar, and address book, as well as a slide-show module, and drawing and communications tools. Jan 95 ◀

★★★★ **OmniPage Professional 5.0, Caere Corp., 408/395-7000, $695.** In a historic first for OCR, this Power Mac software has an accuracy of 100 percent on good text samples. It does still make occasional baffling minor errors on real-world documents. Nov 94 ◀

★★★ **Street Atlas USA 2.0, DeLorme Mapping, 207/865-1234, $79.** For the most part, this geographical information software delivers what it promises at a great price. Oct 94

★★★ **TeamFlow 3.1, CFM, 617/275-5258, $295.** Total Quality Management flowchart software is a valuable business tool. Its report printing and customizability are limited, however. Nov 94

★★★★ **ZipZapp 1.0 (2.0), True Basic, 603/298-8517, $34.** You can use this data-reference utility to find an area code, the correct spelling of a city's name, and more. The interface is intuitive, and the cost, low. Oct 94 ◀

★★★ **ZP4 12.1 (14.4), Semaphore Corp., 408/688-9200, $125.** Inexpensive bulk-mail software supports batch and individual processing, but the progress indicators are uninformative, and unattended operation requires extra work. Sep 94

COMMUNICATIONS/NETWORKS

★ **BLAST Professional, BLAST Inc., 919/542-3007, $139.** Our reviewer could not get this telecom software to work reliably and consistently during his tests, and found the minimalist and quirky interface frustrating. Jan 95

★★★ **CreativePartner, emotion Inc., 415/812-9000, $1500.** Creative collaboration goes digital with this distribution system for video, sound, text, and graphics. Although the system provides a clever way to send annotations over a network, our reviewer wished for either a higher number of features or a lower price tag. Jul 95

★★★★ **FileWave 2.1.2, Wave Research, 510/704-3900, $895.** Maintain a central repository of files and distribute application updates to LAN users with this easy-to-use software-distribution tool. Excellent features include file distribution during idle time and the ability to copy-protect transferred files. Jul 95

★★ **HoloGate 1.0, Information Access Technologies, 510/704-0160, $500.** Two unique features—UUCP and Usenet news distribution—are the primary reasons to consider this product. Otherwise, it comes up price-rich and feature-poor. Apr 95

★★ **The Internet Companion, The Voyager Company, 914/591-5500, $29.95.** Well-written, HyperCard-based electronic book offers less information than others. Internet access is available through accompanying software, but it's a terminal-emulation screen. Dec 94

★★★★ **Internet Explorer Kit and Internet Starter Kit, Hayden Books, 317/581-3500, $29.95 each.** Well-written books and useful software combine to produce one of the best introductions to the Internet available for Mac users. Dec 94

★★★★ **Internet Membership Kit 1.0 (2.0), Ventana Media, 919/942-0220, $69.95.** If you need access to the Internet, this book and software combination is a good package. The best part about it is its included preconfigured software. Dec 94

★★★ **MicroPhone Pro 2.0 (2.1), Software**

continues

Star Ratings

Ventures Corp., 510/644-3232, $195. The new feature set of this communications package includes multiple sessions, faxing, TCP/IP networking, and more, but it's a mixed bag. Not all the features are well integrated, although some are innovations for which users will be grateful. Oct 94

★★★★ **Netscape Navigator, Netscape Communications Corporation, 415/528-2555, $39.** World Wide Web browser is well ahead of the competition in terms of features, stability, and ease of use. Although its E-mail features could use some improvement, it's the best way to surf the Net. May 95

★★★★ **NetWorks 3.0.4, Caravelle Networks Corp., 613/225-1172, $1395 to $2495.** For networks that sprawl across buildings or states, this network-monitoring utility is indispensable. It continually polls devices, checking CPUs, printers, and hubs for signs of life. Apr 95

★ **PowerShare Collaboration Servers, Apple Computer, 408/996-1010, $999.** Before this collaboration software will be ready for prime time, Apple needs to overhaul the complex Admin application and add serious diagnostic aids. Aug 94

★★★★ **ProTerm Mac 1.0, InTrec Software, 602/992-5515, $129.95.** This communications program offers a level of sophistication that belies its small size and relative ease of use. It's fast, reliable, and stable, and is suitable for simple BBS connections or sophisticated scripting. Jul 95

★★★ **QuickMail 3.0, CE Software, 515/221-1801, $199 to $3799.** If you're shopping for a first-time E-mail application, this product is a good choice for ease of use and setup. The most promising new tool, rules-based messaging, lacks some important features. Jan 95

★★★ **RunShare, Run, Inc., 201/529-4600, $199 to $2499.** System extension endeavors to pump up file-transfer speeds across both local- and wide-area networks. It offers twofold to threefold throughput gains for fast Macs and large files but is less useful with small files or slow Macs. Feb 95

★★ **SoftWindows 1.0, Insignia Solutions, 415/694-7600, $499.** You can run Windows software on a Power Mac with this emulation software. Aug 94

★★★★ **White Knight 12.0, The FreeSoft Company, 412/846-2700, $139.** While this telecom software can be bewildering, it works impressively well. If you're willing to read the manual from cover to cover, the program may become your favorite telecom tool. Nov 94

DESKTOP PUBLISHING

★★ **CheckPost 1.3, Working Software, 408/423-5696, $89.95.** Interface aside, this imagesetter-simulation software is generally disappointing. It can't automatically scale pages, it prints on a single sheet, and its error reporting is limited. Nov 94

★★★ **ClickBook 1.1 (1.2), BookMaker Corp., 415/354-8161, $69.95.** If you need to create inexpensive booklets quickly and without hassle, this print utility that helps you format documents in double-sided booklet form is an excellent tool. Nov 94

★★★ **Download Mechanic 1.0.2 (1.5), Acquired Knowledge, 619/587-4668, $249.** The strengths of this PostScript downloader lie in its tools for dealing with problem files, but when dealing with large files, it performs slowly and occasionally crashes. Feb 95

★★★★ **FontChameleon 1.0.1 (1.5), Ares Software Corp., 415/578-9090, $295.** New font-creation technology builds serif and sans serif fonts from a master outline file. It offers high-quality renditions of popular fonts, plus the ability to customize fonts. Sep 94

★★★ **FontMixer 1.0, Monotype Typography, 312/855-1440, $79.** Although a tad expensive for a one-trick pony, this font utility is a straightforward, relatively painless way to mix characters from different fonts to create composite fonts. Oct 94

★★★★ **Fontographer 4.0.4 (4.1), Macromedia, 415/252-2000, $495.** No other font editor does more or works better than this one. For the price of a few font families, it can give you a universe of unique faces. Oct 94

★★★★ **LaserCheck 1.0, Systems of Merritt, 334/660-1240, $199.** Imagesetter-simulation software can save you hundreds of dollars, and many hours, on image-setting jobs by letting you use a laser printer to proof your work. Nov 94

★★★★ **Let'er RIP 2.0 (2.0.1), Lupin Software, 916/756-7267, $239.** The flexibility, clean implementation, and attention to detail of this PostScript downloader make it a pleasure to use. Feb 95

★★★★ **PageTools 1.0, Extensis Corp., 503/274-2020, $129.** Collection of ten PageMaker Additions is packed with utility. Many users will find the PageAlign, PagePrinter, and PageRulers Additions alone worth the price, and the others frosting on the cake. Dec 94

★★★ **ReadySetGo 6.0.2, Manhattan Graphics Corp., 914/725-2048, $395.** There's no strong reason not to use this destop publishing software if its tools meet your needs, but there's no compelling reason to choose it, either. Its low price is nice, but not enough. Oct 94

★★★★ **theTypeBook 4.0, Rascal Software, 805/255-6823, $59.95.** The manual needs work, but this type-specimen generator provides enough customization options to make it a worthwhile purchase. Jun 95

EDUCATION/ENTERTAINMENT

★★★★ **3D Atlas 1.1, EA World, 415/571-7171, $79.95.** Well-designed atlas enriches map data with narration, photos, and QuickTime movies. May 95

★★★★★ **A.D.A.M. The Inside Story, A.D.A.M. Software, 404/980-0888, $79.95.** Multimedia anatomy CD-ROM teaches basic anatomy and physiology with a tantalizing mix of sound, graphics, and animation. If you are the least bit interested in learning more about how the human body works, buy this program. Mar 95

★★★ **Aquazone 1.0, Inago, 416/487-4005, $59.** The fish in this aquarium simulation are beautiful, but they're darned hard to keep alive. Only two varieties of fish are included. Jan 95

★★★ **Creative Writer 1.0, Microsoft Corp., 206/882-8080, $49.95.** Graphics/page-layout/word-processor hybrid offers some terrific type effects, zany sounds, and bright graphics. Sep 94

★★★★ **Crossword Wizard 1.0, Cogix Corp., 415/454-7217, $49.95.** If you're a crossword fan, this crossword-puzzle generator is a must. Although it's not perfect, the play mechanics are fantastic. Dec 94

★★★ **The Cruncher, Davidson & Associates, 310/793-0600, $59.95.** If you want to teach a child spreadsheet basics, this combination educational spreadsheet and business application will do the job. Aug 94

★★★ **CyberBoogie, Times Mirror Multimedia, 314/531-2503, $49.95.** The easy interface, bouncy songs, and cute graphics of this children's animation software make it a good choice for very young kids, but its relative lack of features restricts it to the same group. Apr 95

★★★ **Digital Chisel 1.2, Pierian Spring Software, 503/222-2044, $199.95, site license $995.** If I had a Chisel, I'd Chisel out some quizzes; I'd say how easy this is—no I wouldn't. Ahem. What I mean is: this authoring tool lets educators create interactive quizzes, but suffers from a nonstandard interface. Jun 95

★★★ **Kids World, Bit Jugglers, 415/968-3908, $30.** Although the painting tools could be more robust, this screen-saver-creation tool for kids is easy to use, cleverly designed, and can keep kids busy for hours. Mar 95

★★★★ **Material World, StarPress Multimedia, 415/274-8383, $59.95.** This multimedia CD-ROM provides a fascinating look at diverse cultures from around the world by documenting the lives of average families. Jun 95

★★★ **Small Blue Planet 2.0 (2.0.1), Now What? Software, 415/885-1689, $59.95.** The satellite photos of this atlas are truly dazzling, although the interface is less than world class. May 95

★★★★ **Storybook Weaver Deluxe 1.0, MECC, 612/569-1500, $69.95.** Hooray for applications that encourage kids to be creative! This one lets them combine pictures, sounds, and words to make their own storybooks. May 95

★★★★ **Theorist 2.0, Waterloo Maple Software, 519/747-2373, $299.** Despite an occasionally odd interface (for example, a hammer icon), this symbolic-math program is a great learning aid for students. Jun 95

★★★★ **WarPlanes 1.0, Maris Software, 800/336-0185, $69.** Wonderful multimedia CD-ROM tours the post-WWII era in military aviation. As well as pictures and text, it includes rotatable models of aircraft, an extensive database, and three flight simulators. Mar 95

★★★★ **Widget Workshop, Maxis Software, 510/254-9700, $44.95.** Fiendishly clever mad scientist's laboratory allows you to build Rube Goldberg-style widgets out of metronomes, switches, light bulbs, and much more. It encourages imagination and exploration, plus kids think its cool. Apr 95

FINANCE/ACCOUNTING

★★★★ **M.Y.O.B. 5.0, BestWare, 201/586-2200, $139; $239 w/payroll.** A well-designed interface makes double-entry accounting easy enough for anyone to do. And—for those small-business owners who are keeping an eye on the bottom line—the price is right. May 95

★★★ **QuickBooks 3.0, Intuit, 415/322-0573, $119.** Full-featured double-entry accounting program is easy to use, but its operation is not entirely Mac-like and its cryptic error messages may cause you to ignore serious problems. Jun 95

★★★★ **Quicken 5.0, Intuit, 415/322-0573, $49.95.** The addition of a calendar and new ease-of-use features keep this personal finance software comfortably ahead of the pack. This upgrade is an incremental, but still welcome, improvement over an already excellent product. Feb 95

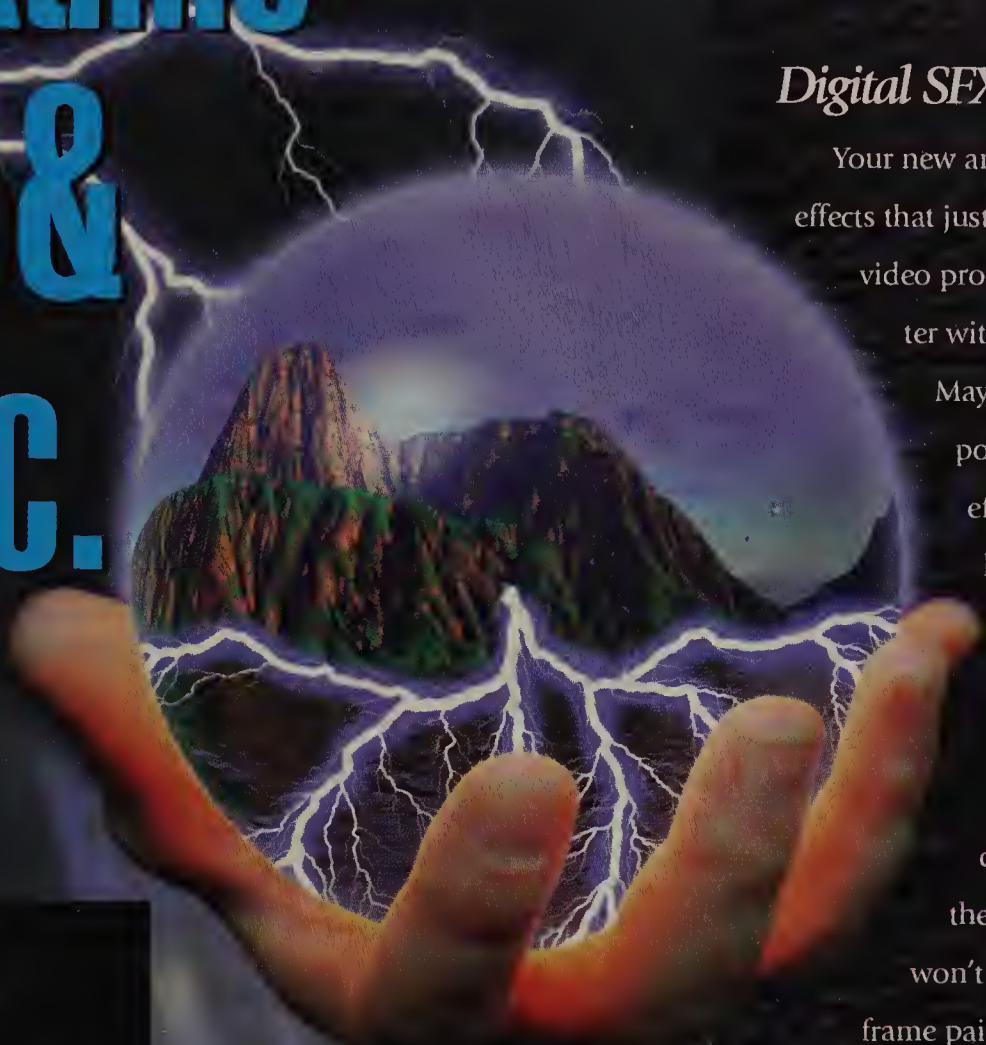
★★★ **StreetSmart 1.0, Charles Schwab & Company, 800/334-4455, $59.** If Schwab is where you want your investments held, and if you want to have tighter control over your portfolio and save on brokerage fees, you should seriously consider this financial investment software. Feb 95

GRAPHICS

★★★★ **Adobe Dimensions 2.0, Adobe Systems, 415/961-4400, $199.** 3-D effects software has added color support, as well as drawing and text tools. Its ability to create resolution-independent 3-D images and map

continues

Quicktime™ Light & Magic.



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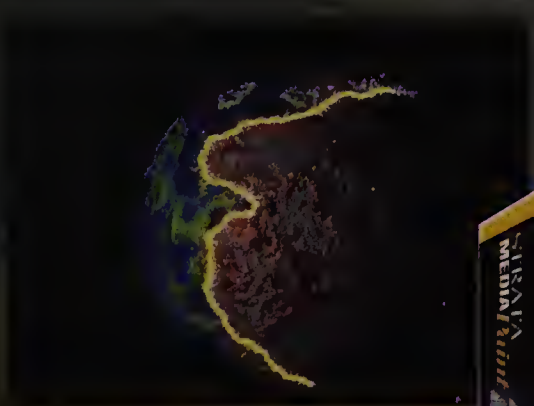

Terraform animation sequence and composite illustration by Steve Cooper.

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Star Ratings

two-dimensional art earn Dimensions a place on a designer's hard drive. Apr 95

★★★★ **Adobe Illustrator 5.5, Adobe Systems, 415/961-4400, $595.** Despite slight speed disappointments, this draw program's upgrade is a bargain. It includes more than 200 tile patterns, 220 fonts, and the Acrobat Distiller and Exchange utilities. Sep 94

★★★★ **Adobe Photoshop 3.0, Adobe Systems, 415/961-4400, $895.** Image-editing program both broadens its capabilities and simplifies its work environment in this dynamic upgrade. While not perfect, the pros far outweigh the cons. Jan 95

★★★ **Alien Skin Textureshop 1.0, Virtus, 919/467-9700, $99.** Apply mutations to master textures to create custom patterns made up of seamless tiles. Control freaks won't like this program's random mutations, but it provides a simple way to create patterns. Jul 95

★★ **Art Explorer 1.0, Aldus Consumer Division, 206/628-2749, $49.95.** While its cartoon style is refreshing and its features promising, this paint/draw program for kids is still rough around the edges. Its biggest limitation is that it's unusably slow on 68030 Macs. Feb 95

★★★★ **Blueprint 5.0, Graphsoft, 410/290-5114, $295.** For plain old 2-D drafting, this CAD software has a rich, easy-to-use feature set and is admirably fast. The Power Mac version in particular is a first choice for large architectural or engineering diagrams. Jan 95

★★★ **CD-Q 2.0, Human Software Company, 408/741-5101, $145.** Take advantage of Kodak's YCC format for Photo CD with this Photoshop plug-in, which lets you make color corrections and fine-tune color separations. If you frequently use Photo CD for image processing, this is the way to go—if you don't mind an inelegant interface and perfunctory documentation. Jul 95

★★★ **ClarisDraw 1.0 (1.0v2), Claris Corp., 408/727-8227, $399.** For presentations without grand artistic pretensions, this draw program can be an effective tool. Considering the wobbliness of some of its features, however, $400 may be too much to pay. Jan 95

★★★ **Dabbler 1.0, Fractal Design Corp., 408/688-5300, $99.** Art-education and paint software provides an excellent paint set with an appealing if slightly quirky interface, at a great price. Nov 94

★★★★ **DeBabelizer Lite 1.0 (1.1), Equilibrium Technologies, 415/332-4343, $129.** Terrific graphics utility converts graphics files from one format to another. Aug 94

★★★★ **ElectricImage Animation System 2.0 (2.1), Electric Image, 818/577-1627, $7495.** Although the price may seem incredibly high, this software, with its extraordinary animation and image-rendering capabilities, is worth every penny for cinematic-production professionals. Dec 94

★★★ **Flying Colors, Davidson & Associates, 310/793-0600, $59.95.** While not the most dynamic kids' program, this paint/draw program provides easy-to-use tools and nicely drawn stamps for ages eight to adult. Feb 95

★★★★★ **Fractal Design Painter 3 (3.1), Fractal Design Corp., 408/688-8800, $499.** Image-creation program has achieved a rare state of perfection, balancing enhanced conventional controls with spectacular effects packaged inside a tidy interface. It offers a new level of usability and genuine practicality. Apr 95

★★★ **FullPixelSearch 1.5, Avian Systems, 201/224-2025, $1295.** Analyze scientific images with a variety of pixel-selection functions. It's a useful tool for scientists, but could use batch processing, scripting, the ability to handle 12- and 16-bit images, and a heftier manual. Jul 95

★★★ **Gryphon Batch It 1.0, Gryphon Software, 619/536-8815, $199.** Arranges tiles in a visual interface to automate repetitive graphics operations. Although it lacks conditional statements, this batch processor is a time-saver. Jun 95

★★★★ **IntelliDraw 2.0 (2.0.1), Adobe Systems, 415/961-4400, $99.99.** Wonderful general-purpose graphics package works well, does a great job of automating drawing tasks, and is straightforward. Despite its breadth of features, it always feels approachable. Sep 94

★★★ **Koyn Fractal Studio 2.02 (2.1), Koyn Software, 314/878-9125, $119.95.** Software lets you generate beautiful fractals of your own design. Aug 94

★★★★ **KPT Bryce 1.0 (1.1), HSC Software, 805/566-6200, $199.** For less than $200, you get a remarkable 3-D landscape-rendering program, a CD-ROM full of images, a slide-show utility, and screen-saver modules. Although the innovative, graphics-heavy interface can be confusing, this software is lots of fun. Dec 94

★★★ **Live Picture 1.5.5, HSC Software, 805/566-6200, $995.** Image editor is a promising program rather rudely assembled atop some marvelous technology. Though fast and blessed with the benefits of a proxy-based system, its day-to-day functions leave room for improvement. Dec 94

★★★★ **LogoMotion 1.0 (1.5), Specular International, 413/253-3100, $149.** Easy-to-use 3-D package is eminently affordable. It's a terrific program, both for creating flying logos and as an entry-level 3-D package for nonprofessionals. Nov 94

★★★★ **MacDraft 4.0, Innovative Data Design, 510/680-6818, $449.** Report-links to Excel and a clean interface make this 2-D CAD software an excellent choice for use in mechanical engineering and construction. Plus, it's easy to learn. Mar 95

★★★★ **Macromedia FreeHand 5.0, Macromedia, 415/252-2000, $595.** The new version of this venerable program has not only kept pace with the competition but has also added unique features of its own. Although the interface is more cluttered than ever, the wealth of new capabilities make this the drawing program to buy. May 95

★★★★ **MetaFlo', The Valis Group, 415/435-5404, $595.** Graphics utility yields interesting visual effects with a minimum of fuss. It imparts elasticity to 2-D images, letting you push and pull collections of pixels. Aug 94

★★★★ **MiniCad 5, Graphsoft, 410/290-5114, $795.** Excellent CAD software for the Power Mac offers major performance for its price. It's admirably easy to learn. Nov 94

★★★ **MovieFlo' 1.1, The Valis Group, 415/435-5404, $899.** Tug, twist, and pinch your sister—or at least a digital image of her—with this special-effects program for stills or QuickTime movies. Well-designed application is hampered by a steep price and a poor manual. Jun 95

★★★★ **PhotoEnhancer 1.0, PictureWorks, 510/855-2001, $129.** Nifty utility provides dozens of ways to improve the quality of QuickTake photos, from sharpening or softening focus to correcting over- or underexposed shots. Choose an image from a display of enhanced photos to speed the correction process. Apr 95

★★★ **PhotoFlash 2.0, Apple Computer, 408/996-1010, $129.** If you want to enhance or catalog images acquired from a scanner or a digital camera such as Apple's QuickTake 100, consider this utility. It's not a high-end image-editing program, but it does offer basic image-retouching tools and support for Photoshop filters at a reasonable price. Jul 95

★★★ **PhotoMatic 1.01 (2.0), DayStar Digital, 404/967-2077, $199.** AppleScript-based utility lets you automate tasks in Adobe Photoshop 2.5.1 or later. Although it's limited, it can relieve you of some mundane chores. Nov 94

★★★★ **Pixar Typestry 2.1, Pixar, 510/236-4000, $299.** With QuickDraw GX support, an approachable interface, a strong array of animation features, and outstanding image quality, this 3-D type-effects software is worth a try. It adds a new dimension to the way you look at type. Feb 95

★★★★ **PixelPaint Pro 3.01, Pixel Resources, 404/449-4947, $379.** Color paint program strikes a good balance between the artistic demands of painting and the technical precision of image processing. New color-management capabilities are a plus for professional users. Mar 95

★★★ **PixelPutty Solo, The Valis Group, 415/435-5404, $349.** Affordable modeler lets you manipulate 3-D objects as if they were clay. It's a capable program, but a bare-bones interface and skimpy manual make it somewhat daunting for novices. Jun 95

★★★ **Ray Dream Designer 3.1.1, Ray Dream, 415/960-0768, $349.** 3-D graphics program provides competent (if sometimes awkward) modeling tools, offers excellent surface-texturing capabilities, and produces high-quality ray-traced renderings. Mar 95

★★★ **ScanPrepPro 1.2 (2.0), ImageXpress, 404/564-9924, $695.** Adobe Photoshop add-on automates the scanning and image-massaging process and produces good results, although the program is somewhat unstable. Nov 94

★★★★ **Scenery Animator 1.0.4 (1.1), Natural Graphics, 916/624-1436, $149.** Landscape rendering and animation software uses U.S. Geographical Survey data to create remarkably realistic 3-D representations of terrain. Aug 94

★★ **Select 1.6, Human Software Company, 408/741-5101, $245.** Although its selection mode provides a convenient and intuitive way to make changes to several colors at once, all the features of this CMYK color-correction plug-in can be found in Photoshop. Jul 95

★★★ **Specular Collage 2.0.1, Specular International, 413/253-3100, $399.** Practical image-compositing solution supplies a smooth interface and strong support for Adobe Photoshop 3.0. As long as you're willing to return to Photoshop to confirm your edits and make final changes, it's a serviceable tool. Feb 95

★★★ **Terrazzo 1.0, Xaos Tools, 415/487-7000, $199.** Turning a random group of pixels into a geometric pattern may not be everyone's consuming passion, but this plug-in graphic-effects module has definite appeal for a select niche of fabric, graphic, and video designers. Nov 94

★★★★ **TextureScape 1.5, Specular International, 413/253-3100, $195.** Algorithmic art program lets you manipulate and arrange PostScript shapes to create seamlessly repeating patterns. Like the best tools, it's simple enough to be fun and flexible enough to give you meaningful control. Feb 95

★★★★ **TypeTwister 1.0, Adobe Systems, 415/961-4400, $29.99.** Inexpensive, easy-to-use, and fun type styler lets you create wildly styled text effects, although it won't satisfy hard-core type manipulators. Jan 95

★★★ **Virtus WalkThrough Pro 2.0, Virtus Corp., 919/467-9700, $495.** Aside from occasional stumbles, this design tool is an exceptional program that lets you quickly and intuitively interact with your designs and gives clients the opportunity to visit and explore your creations before they are built. Apr 95

★★★★ **Vision 3d 4.0, Strata, 801/628-5218, $695.** The new version of this 3-D modeling, rendering,

continues

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Star Ratings

and animation package expands its array of modeling tools and adds two renderers. Plug-in extensions provide a practical way to customize the program, while informative and easy-to-read documentation makes learning its many features relatively painless. Jul 95

★★★ **Vistapro 3.0, Virtual Reality Laboratories, 805/545-8515, $149.95.** 3-D landscape rendering software uses digital versions of U. S. Geological Survey maps to create images and allows you to add external features such as buildings and rivers. Although it's a good program, it has some limitations. Feb 95

★★ **xRes 1.11, Fauve Software, 415/543-7178, $799.** You can apply a variety of effects to selected areas of a large composition with this image editor. Although it offers pluses such as useful filters and customizable gradients, this program's numerous interface oddities make it less attractive than the competition. Jul 95

MATH/SCIENCE

★★★★ **Chamber Works 1.0.2 (1.1), OnScreen Science, 617/776-6416, $99.** Simulator for particle-physics events is the best introduction to particle physics yet produced, at a great price. Dec 94

★★★★ **JMP 3.0 (3.1), SAS Institute, 919/677-8000, $695.** This statistics software can be used for a wide range of biological, chemical, and physical-science investigations. New features include floating tool palettes, an annotation tool for data tables, and an experimental-design module. Sep 94

★★★ **Kekulé 1.1, PSI International, 410/821-5980, $495.** Science software reads scanned chemical-structure drawings and interprets them, giving both a diagram for checking interpretation accuracy and a formal string representation of the structure. Nov 94

★★★ **Maple V 3.0, Waterloo Maple Software, 519/747-2373, $795.** If you prefer to do your own programming and function creation, you'll benefit from this symbolic mathematics software's efficient use of your Mac's resources. This version hits most of the points on your symbolic-math wish list. Oct 94

★★★★ **MATLAB 4.1 (4.2c), The Math Works, 508/653-1415, $1695.** Relatively expensive numerical math software has added nearly 100 new graphics commands, improved its treatment of sparse matrices, and added commands for sound processing. Its toolboxes make it a first choice for many applied-science specialties. Nov 94

★★★★ **MLab, Civilized Software, 301/652-4714, $1495.** Mathematical-modeling software lets you do fast computation on numerically complex real-world problems, using an ancient Mac II or higher. You must be willing to write short programs, but professional researchers will find it a rewarding choice. Apr 95

★★★★ **Spyglass Plot 1.0 (1.01), Spyglass, 217/355-6000, $295.** This scientific-charting software is the first choice for serious large-set plot crunching. Oct 94

★★★★ **Statistica/Mac 4.1, StatSoft, 918/583-4149, $695.** At present, this statistical software is the undisputed features-per-dollar champion in the Mac market. Mar 95

★★★★ **SuperScope II 1.25 (1.4), GW Instruments, 617/625-4096, $1490.** Despite a relatively small instrument library, this laboratory data-acquisition software effectively covers a wide range of needs, and learning to use it won't become your life's work. Oct 94

★★★★ **Survival Tools 1.0 (1.1), Abacus Concepts, 510/540-1949, $295.** The combination of survival analysis with the StatView template systems gives you a virtual actuary-in-a-box. It's a great set of tools, conveniently packaged. Feb 95

ORGANIZATION/PRODUCTIVITY

★★★ **ACT 2.0, Symantec Corp., 503/334-6054, $249.95.** Contact manager's file-level compatibility with DOS and Windows and its complete contact management make it worth considering if you can live with its weak scheduling functions. Mar 95

★★★★ **Arrange 2.0, Common Knowledge, 415/325-9900, $349.** If your needs fall beyond the usual calendar and address-book functions, this personal information manager is a strong contender. It now has more calendar functions and print options. Dec 94

★★★ **Claris Organizer 1.0 (1.0v2), Claris Corp., 408/727-8227, $99.** New personal information manager users, lured by the low price, good performance, and ease of use of this product, will find that it meets their needs. Most longtime PIM users won't be tempted to switch. Jan 95

★★ **ClienTrac 2.0, Whiskey Hill Software, 415/851-8702, $99.** It's easy to enter contact information, but this PIM is slim on speed, features, and flexibility. May 95

★★★★ **DateBook & TouchBase Pro Bundle 4.0, Adobe Systems, 415/961-4400, $89.99.** Personal information manager package is now easier to use and offers many new features. The excellent linking between the contacts and calendar is the most significant feature. Sep 94

★★★ **DateView 1.0.1 (1.0.2), Prairie Group, Inc., 515/225-3720 , $69.95.** If you're willing to sacrifice some features to get simplicity and speed, this calendar/to-do manager makes sense. It integrates with the contact manager, InTouch. Aug 94

★★★ **Day-to-Day Organizer 1.0, Portfolio Software, 802/434-6400, $149.95.** The address-book and outlining components of this organizer are great, but overall, it's a mixed bag. The calendar interface and the way it handles recurring events need to be improved. May 95

★★★ **Dynodex for Macintosh 3.5 (3.5.2), Portfolio Software, 802/434-6400, $69.95.** Although this program doesn't currently link to a calendar, it is an excellent contact manager. This upgrade has a few new features, improved performance, and an easier-to-use interface. Sep 94

★★★ **Expresso 1.0, Berkeley Systems, 510/540-5535, $69.99.** The just-the-basics approach of this calendar and address book might be just fine for people who don't need the feature set of other calendar programs and enjoy its graphics. Apr 95

★★★ **FastPace Instant Contact 1.0 (1.1), Attain Corp., 617/776-1110, $39.99.** Although this contact manager could use a few additional features—especially a menu-bar search function—it does a capable job, and it is intuitive and easy to use. Jan 95

★★★ **First Things First Proactive 1.1, Visionary Software, 503/246-6200, $149.** Capable scheduling program has some convenient features. It's worth a look if you don't have to share information with a contact manager. Nov 94

★★★★ **In Control 3.0.4 (3.0.7), Attain Corp., 617/776-1110, $85.** Excellent to-do-list manager and outliner, coupled with a good calendar is a strong choice if you live and die by to-do lists. Oct 94

★★★★ **Now Contact and Now Up-to-Date 3.0, Now Software, 503/274-2800, $99.** Taken together, this contact manager and calendar provide a set of solid, reliable tools for keeping your life in order. Users who need to share information over a network may find it close to ideal. Apr 95

★★ **Peanuts Family Organizer 1.0, Individual Software, 510/734-6767, $19.95.** "Hey, Pop, can I borrow the car Saturday night?" "Look at the family PIM and check my calendar, Son." This organizer's endearing interface doesn't make up for missing or poorly implemented features. Jun 95

★★ **Souvenir 2.2, ComposeTel, 415/327-0744, $49.** While this contact manager is fast and simple, it's hard to recommend it when you can buy integrated contact managers and schedulers for about the same price. Dec 94

★★★ **TimeSquare 1.0 (1.0.6), Team Building Technologies, 514/278-3010, $149.** Fast, flexible, network calendar program has lots of handy features, but it's missing a few as well, such as multiday events and label grouping. Aug 94

PRESENTATION TOOLS

★★★★ **Adobe Premiere 4.0 (4.0.1), Adobe Systems, 415/961-4400, $795.** Video-editing software for the Power Mac remains as solid and reliable as previous versions, and also advances far and above its competitors with new and improved professional-level features. With the right hardware, it can give desktop-video editors broadcast-quality products with a minimum of compromises. Dec 94

★★★ **Amazing Animation 1.0, Claris Corp., 408/727-8227, $49.** Cute pictures, funny sounds, and a kid-friendly interface come together in this package that lets children produce short animations or interactive presentations. The canned animations and scenes grow tiresome, however. Jan 95

★★ **Animation Master 2.0.5 (2.09), Hash Inc., 206/750-0042, $699.** Although this animation software packs extraordinary power at a reasonable price, it's difficult to learn and prone to instability. Oct 94

★★★ **Electronic Marker 1.0.2, Consumer Technology Northwest, 503/643-1662, $34.95.** This annotation tool can be a practical enhancement to live demonstrations and on-screen presentations, but it needs better controls for modifying and preserving markup layers. May 95

★★★ **HyperCard 2.2, Apple Computer, 408/996-1010, $249.** Authoring tool strikes a good balance between power and ease of use, and its price is reasonable. It may not satisfy all your wishes, but it should keep you happily building stacks. Sep 94

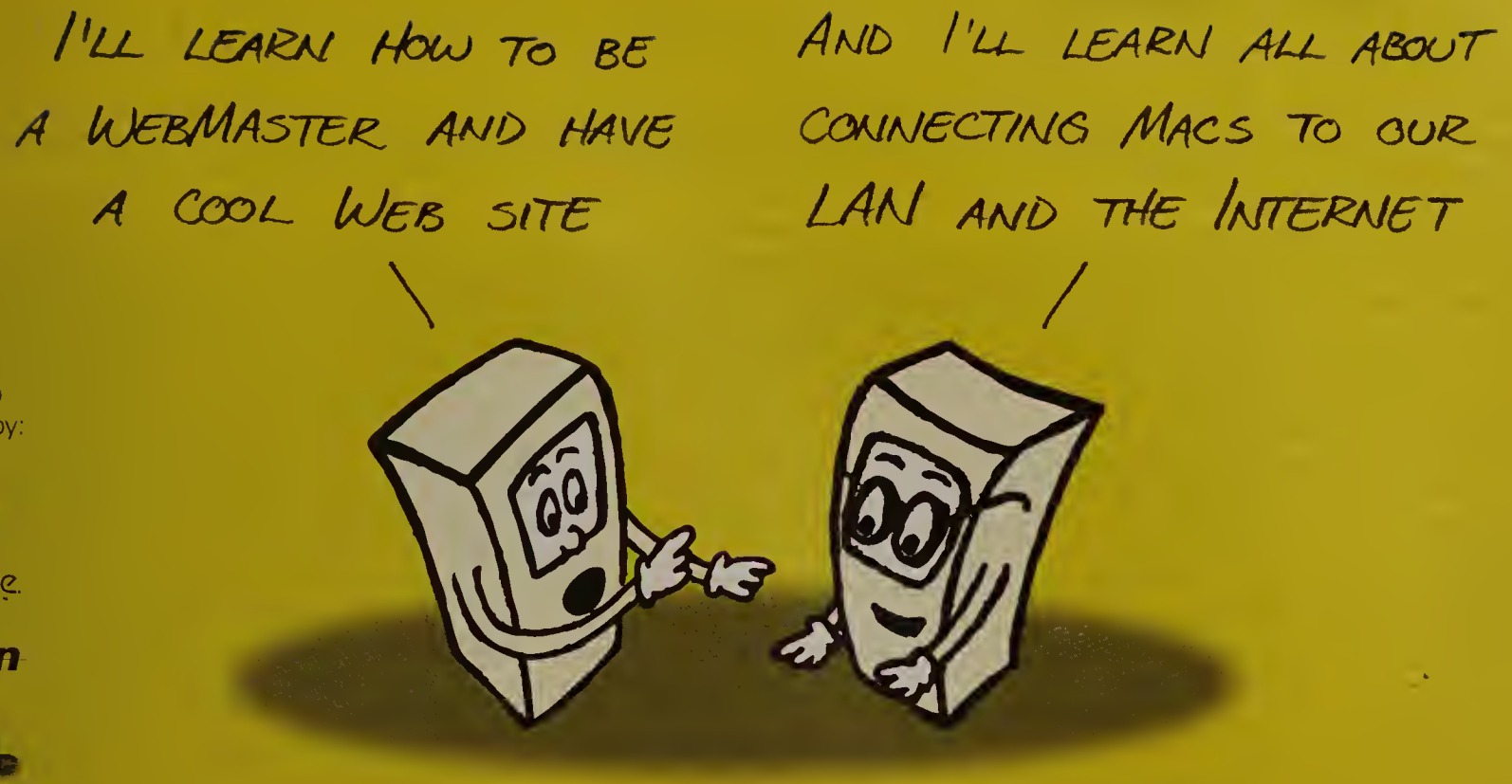
★★ **Living Album 2.5, QuickMedia Labs, 408/749-9200, $129.95.** A crowded interface detracts from the usefulness—and aesthetics—of this multimedia album. May 95

★★★★ **Macromedia Director 4.0 (4.04), Macromedia, 415/252-2000, $1195.** Although this multimedia program remains far from easy to use, this admirable upgrade increases the program's power and improves its interface. Multimedia professionals will continue to find it the best package available. Sep 94

★★★ **Microsoft PowerPoint 4.0, Microsoft Corp., 206/882-8080, $339.** If you're in the market for a presentation-graphics program, this is a good choice to use along with Word or Excel, as long as you don't mind the lack of animation functions. For general purposes, though, other alternatives have the edge. Feb 95

★★ **MovieWorks 2.0.2, Interactive Solutions,**

continues



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Star Ratings

415/377-0136, $295. With diligence you can get decent results with this all-in-one QuickTime-based multimedia package. But other entry-level programs make leaping into multimedia easier and more rewarding. Sep 94

★★ **mPower 2.0, Multimedia Design Corp., 704/523-9493, $295.** Despite a handful of sophisticated multimedia features, this authoring tool is too limited to be compelling. While its push-button interface is easy to understand, it's far too cumbersome. Apr 95

★★★ **The Multimedia Workshop, Davidson & Associates, 310/793-0600, $79.95.** Children or adults can use this media-integration tool without big investments of either time or money. It's full of compromises, though, such as the inability to layer narration over music. Nov 94

★★★★ **Persuasion 3.0, Adobe Systems, 206/622-5500, $495.** Users have plenty of new features to cheer about, including improved tool palettes, extensive charting options, and hypertext functions with this presentation graphics program's upgrade. High memory and disk-space requirements are drawbacks. Sep 94

★★★★ **Presenter Professional 3.0, VIDI, 818/358-3936, $1995.** The improved interface, enhanced animation module, and reduced price of this 3-D modeling and animation package make it an excellent choice for multimedia producers. The new audio features are especially appealing. May 95

★★★ **SoundEdit 16, Macromedia, 415/252-2000, $379.** Digital audio software supports 16-bit sound and has enough goodies to earn it a place in a multimedia producer's toolbox. But its lack of record-level controls limits its usefulness as a professional audio tool. Dec 94

★★ **Special Delivery 2.0, Interactive Media Corp., 415/948-0745, $399.** Multimedia authoring tool can be confusing and isn't the best choice for complex projects. Still, it may save hours of training for users who merely need to create simple presentations. Apr 95

★★★★ **SuperCard 1.7.1 (2.0), Allegiant Technologies, 619/587-0500, $495.** Multimedia authoring system adds a few welcome enhancements and squashes some old bugs. For current users, the upgrade is well worth the price; for others, it's an excellent alternative to more expensive authoring systems. Feb 95

PROGRAMMING

★★★★ **IDL 3.5 (3.6), Research Systems, 303/786-9900, $1500.** In this shockingly powerful, compact, graphics-oriented, interpreted language, a single command is worth a page of C-language code. If you're an image processing professional, you should consider adding IDL to your tool kit. Oct 94

★★ **ScriptWizard 1.0, Full Moon Software, 408/253-7199, $99.** Software attempts to make writing and debugging AppleScript scripts easier. Unfortunately, it doesn't offer enough improvement over Apple's Script Editor. Jan 95

★★★ **Symantec C++ 8.0, Symantec, 503/334-6054, $499.** The new version of this development environment offers native PowerPC compilers for C++ and ANSI C. The project manager and class browser have been improved, and the compiled code is laudable. While our reviewer had some complaints about the package's resource demands and the company's support reputation, this C++ compiler is well above average. Jul 95

★★★★ **VIP-C 1.5 (1.5.1), Mainstay, 805/484-9400, $495.** For convenience in producing 68000/Power Macintosh applications, this programming utility is a fine investment. Intermediate to advanced users will get the most benefit, but even beginners will find that it helps turn student projects into serious apps. Feb 95

UTILITIES

★★ **Apple Personal Diagnostics 1.0 (1.1), Apple Computer, 408/996-1010, $129.** In trying to make a hardware tool for the rest of us, Apple has come up short. This hardware-diagnostics utility has an uneven manual, some less than thorough tests, and a surprisingly unsatisfying interface. Nov 94

★★★★ **Cal 1.0, Thought I Could, 212/673-9724, $79.95.** Well-chosen set of desktop necessities includes an excellent calculator, an associated-formula editor, a datebook, and a calendar. Due to its easy access and ample power, this software has become an everyday tool for our reviewer. Jan 95

★★★ **CanOpener 3.0, Abbott Systems, 914/747-4171, $125.** You can use this handy utility to open many types of files—which can be a lifesaver if you don't have the application a file was created in—but it falls a little short in the file-search department. May 95

★★★★ **CD Directory 1.0, Insignia Solutions, 415/694-7600, $69.95.** Store catalogs of CD directories on your hard drive—and access them at hard drive speeds—with this handy utility. One complaint: cataloged CDs are treated as local drives, and this greatly increases search time during a global search. Jul 95

★★★★★ **Conflict Catcher II 2.1.1, Casady & Greene, 408/484-9228, $79.95.** Customizable, fast, and safe extension-management utility goes well beyond the basics. For Power Macintosh users, it even tells which extensions aren't written in native code and are likely to slow down Power Macs. Oct 94

★★★★ **Disc-To-Disk, Optical Media International, 408/376-3511, $199.** Audio-capture utility's friendly interface provides a simple way to transfer sound from a CD to the Mac's hard drive. A useful tool for multimedia authors. Jun 95

★★★★ **DiskGuard 1.0.1 and DiskGuard Remote, ASD Software, 909/624-2594, $129 to $799.** Rock-solid, flexible disk-protection tools are worth serious consideration if your Mac or Macs are accessible to other users. The remote version (which comes in five- and ten-user packs) adds network features, including clock synchronization. Mar 95

★★★ **DragStrip 1.0, Natural Intelligence, 617/876-4876, $39.95.** Icon-based file and folder organizer brings a semblance of order to your cluttered desktop. But your troubles aren't over unless a future version lets you label folders. May 95

★★★★ **Drive7 3.0 (3.09), Casa Blanca Works, 415/461-2227, $89.95.** Highly recommended hard drive-formatting utility easily formats and partitions most drives and provides all the options you need. And within its limitations, its Mount Cache utility provides a real performance boost. Nov 94

★★★ **eDisk 2.0, Alysis Software Corp., 415/928-2895, $149.95.** Driver-level software compresses data read to your drive on the fly and automatically expands data read from your drive. It offers transparent compression. Dec 94

★★★★ **FolderBolt Pro 1.0.3, Kent Marsh, 713/522-5625, $129.95.** Feeling unsecured? Top-notch encryption schemes and flexible access controls let you secure your Mac's contents by password-protecting folders and encrypting the data they contain. Jul 95

★★★★ **Graffiti 1.01, Palm Computing, 415/949-9560, $79.** If you can't seem to teach Newton your handwriting, you can teach yourself a new writing system that Newton can handle. Kind of makes you wonder who's running the show, but it works. May 95

★★★★ **Icon Mania 1.0 (1.02), Dubl-Click Software, 503/317-0355, $69.95.** Delightful icon-editing utility comes with terrific tools for building new icons, including an outstanding thumbnail feature that builds custom icons from graphics files. Aug 94

★★★★ **Kaboom 3.0, Nova Development Corp., 818/591-9600, $49.95.** Sound-effects utility with sound-editing application is a fun program for anyone who wants to play with sound. Feb 95

★★★★ **Launch Pad 1.0, Berkeley Systems, 510/540-5535, $49.99.** If you want to share your Mac with your kids, this desktop utility is a worthwhile investment. It can even speak menu items and file names out loud for kids too young to read. Jan 95

★★★ **MacTools Pro 4.0, Symantec Corp., 503/690-8090, $149.95.** This utility does a good job of diagnosing and fixing disk problems, but suffers from large RAM requirements and expensive technical support. May 95

★★★★ **Maxima 3.0, Connectix, 415/571-5100, $99.** If you have more than 8MB of RAM, you can use some of it as a RAM disk, speeding up disk-based operations, with this inexpensive utility. Nov 94

★★★★ **MultiClip Pro 3.1, Olduvai Corp., 305/670-1112, $59.** Easy-to-use utility is exactly what Apple's Clipboard and Scrapbook should have been; a convenient repository of data that moves between documents without fuss or muss. Apr 95

★★★ **Multimedia Utilities 1.1, Motion Works, 415/541-9333, $299.** Six utilities address many aspects of QuickTime moviemaking, from editing movies and sound tracks to creating morphs, animations, and screen recordings. Although the utilities are appealing, you must save early and often because of frequent crashes. Jul 95

★★★★ **Norton DiskDoublerPro 1.1, Symantec Corp., 503/334-6054, $109.** Utility collection includes DiskDoubler , AutoDoubler, and CopyDoubler. Because of its ease of use, the product is a good choice for beginners. Feb 95

★★★ **Norton Utilities for Macintosh 3.1, Symantec Corp., 503/334-6054, $149.95.** Data-protection and -recovery utility collection is leaner, meaner, and faster than ever before, but it's also surprisingly uneven. While Disk Doctor leads the pack for disk-repair utilities, the back-up module is weak and the new UnErase module is missing some features. Feb 95

★★★★ **Now Utilities 5.0, Now Software, 503/274-2800, $89.** Three of the modules of this fine-tuned, interlocking utility set—Now FolderMenus, Now Menus, and Now SuperBoomerang—are almost indispensable, and while the other six may not be tops in their category, they're well worth considering. As a collection, this package remains the best in the business, and it's Power Mac native. Jan 95

★★★★ **OptiMem RAM Charger 2.0.1, Jump Development Group, 412/681-2692, $129.** Use RAM more efficiently with this memory-management utility. The Mac OS ought to work like this, but until it does, you should use this nifty utility. (An added bonus: it works on older Macs, back to the Mac Plus.) Jul 95

★★★ **PaperPower 1.0, Piptel, 513/294-6656, $149.** Graphics-tablet utility provides a useful tool for creating and using macros, but the overlays it creates can be tricky to use. Apr 95

continues

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Star Ratings

★★★ **Peirce Print Tools 1.0, Peirce Software, 408/244-6554, $129.** Nine handy printing utilities work with QuickDraw GX. Most of the modules are useful, but not all are must-haves. Jan 95

★★★ **PopupFolder 1.0 (1.5.1), Inline Software, 617/935-1515, $59.95.** Finder utility is so handy and easy to use, you wonder why it isn't built into the Mac's system software. Aug 94

★★★★ **PowerAgent 1.1 (2.0), SouthBeach Software Corp., 305/942-0605, $159.** You can revolutionize your Macintosh work with this agent program that manages scripts. It provides excellent support for FileMaker Pro. Nov 94

★★★★ **PowerMerge 2.0, Leader Technologies, 714/757-1787, $129.** Powerful file-management tool helps you keep individual files, folders, or entire volumes organized and up-to-date. Aug 94

★★★ **ProFiles 1.0, Dayna Communications, 801/269-7200, $129.** Unusual new utility lets you group related files and folders for quick access and actions such as making aliases, copying, and more. Aug 94

★★★ **RapidCD 1.04, Insignia Solutions, 415/694-7600, $69.95.** RAM and disk caching of CD-ROM data speeds access to frequently used data. This utility does its job well, but it's incompatible with the AppleCD Audio Player and doesn't allow you to add to its settings. Jul 95

★★★ **RescueTxt 1.0, Abbott Systems, 914/747-3116, $79.** If you want decent performance and the ability to locate text in even a deleted file, this text-retrieval utility is a good choice. It doesn't tell you what file the text comes from, however, so you cannot simply open the found file. Apr 95

★★ **SCSI Director Pro 3.0.6 (3.1.1), Transoft Corp., 805/565-5200, $99.** Utility provides simple, one-button hard disk formatting, but when it comes to doing some of the fancy tricks, the going gets rough. Sep 94

★★★★ **Square One 2.0 (2.0.1), Binary Software, 310/449-1481, $74.** The slick design, flexibility, and straightforward interface of this file-launching utility make it a pleasure to use. Dec 94

★★★ **Stop & Go 4.0, Engram International, 415/455-1100, $69.99.** File-protection/relaunch utility uses a portion of your hard disk to save a snapshot of the data in your Mac's RAM. It's fast, and it relaunches files, applications, and extensions in a single, unified process, but it's unduly complicated. Oct 94

★★★★ **StuffIt Deluxe 3.5, Aladdin Systems, 408/761-6200, $129.95.** If you're looking for a compression solution, you should look at this product. Its drag-and-drop applications, Magic Menu, and file translators make it easy to integrate compression into your routine. Mar 95

★★★★ **TypeTamer 1.0.4, Impossible Software, 714/470-4800, $59.95.** Versatile font utility provides information on installed fonts and simplifies tasks such as typing special characters and reselecting fonts from the menu. May 95

★★★★ **Virex 5.5.1, Datawatch Corporation, 508/988-9700, $99.95.** Comprehensive, reliable, and speedy utility helps protect your files from those misguided lads who get their jollies by releasing viruses. To keep it current, updates are available on online services. May 95

VERTICAL MARKETS

★★★ **Autoscore 1.0, Wildcat Canyon Software, 510/527-5155, $150.** Converting the human voice into MIDI note information is a challenging task. If you have the right music software, mike, and voice, this music-recognition software can actually pull it off. Feb 95

★★★ **Bird Brain 2.01, Ideaform, 515/472-7256, $99.95.** Database lets bird watchers record every sighting of every bird they have ever seen to create electronic life lists. Although it can be slow, it includes species names and other information. Jan 95

★★★ **ConcertWare 1.5.7, Jump Software, 415/917-7460, $159.** Although it lags behind the competition in performance and features, this music-notation program's low price and ease of use make it a viable choice for the budget-wise. Jun 95

★★★ **DigiTrax 1.1, Alaska Software, 408/738-3320, $349.** If you're an amateur musician or a multimedia producer with modest sound-recording needs and you have a Quadra AV, consider this audio-recording software. What it lacks in features, it makes up for in simplicity and a relatively low price tag. Mar 95

★★★ **ErgoKnowledge 1.0, Visionary Software, 503/246-6200, $395.** Despite a few shortcomings, this CD-ROM offers a good, basic review of office-computer ergonomics. Dec 94

★★★ **MayaCalc 2.3.1 (2.3.3), Ecological Linguistics, 202/546-5862, $120.** 4th Dimension database alleviates much of the pain involved in working with the complex, multilayered Maya calendar. Although the design could be improved, it's a highly useful tool for both serious and casual Maya enthusiasts. Feb 95

★★★★ **Maya Hieroglyphic Fonts, Ecological Linguistics, 202/546-5862, $10 to $60 per set.** Although these fonts based on Mesoamerican hieroglyphic scripts are beautifully rendered, the character spacing is sometimes uneven. Feb 95

★★★★ **Mayo Clinic, Family Health Book IVI Publishing, 612/996-6000, $69.95.** Medical CD-ROM for home use deals with the full gamut of health-care topics, from AIDS to zygotes, although it doesn't include any reference to alternative therapies. Sep 94

★★★ **Mayo Clinic: The Total Heart 1.0, IVI Publishing, 612/686-0779, $21.75.** Cardiovascular health and related subjects are the topics of this medical CD-ROM for home use. Although it makes liberal use of drawings, photographs, and animations, video sequences would have been more effective. Sep 94

★★★ **Medical HouseCall 1.0, Applied Medical Informatics, 801/464-6200, $99.95.** Interactive medical guide is a painless way for people to learn about diseases, tests, and therapies. Although it's easy to use and interesting, some images were incorrectly labeled. Feb 95

★★★ **MusicTime 2.0 (2.0.1), Passport Designs, 415/726-0280, $149.** Music-notation program is geared for hobbyists and students. If your needs aren't complex, it may fit the bill, at a great price. Oct 94

★★★★ **Overture 1.02, Opcode Systems, 415/856-3333, $495.** Easy-to-learn, midrange notation software has a friendly interface and shows real polish. If you don't need all the features of a high-end product, it's a serious contender. Apr 95

★★★ **Performer 5.02, Mark of the Unicorn, 617/576-2760, $495.** A colorful, redesigned interface and improved sheet-music view are just part of this MIDI recording program's worthwhile overhaul. If you like the sheet-music view, this is the product to buy. Mar 95

★★★★ **Practica Musica 3.0 (3.1), Ars Nova Software, 206/889-0927, $140.** Music-teaching program, with emphasis on sight-reading and ear-training techniques, shines as a smart, infinitely patient personal music coach in the classroom. Jan 95

★★★ **Route 66 1.5, Route 66 Geographic Information Systems B.V., 415/957-0666, $79.95.** Jack Kerouac could have saved a lot of time if he'd used this route planner (unless he was planning to drive to Alaska, which isn't included). It's fast, but omits some cities and can't handle more than three destinations. May 95

★★★ **SAM-CD, Scientific American Medicine, 212/754-0550, $395.** Despite a few shortcomings, such as the poor interface for case simulations, this medical reference work—a popular series of publications covering topics in clinical medicine—should prove a worthwhile addition to any medical library. Sep 94

★★★ **Vision 2.08, Opcode Systems, 415/856-3333, $495.** MIDI program's list of exclusive, creativity-slanted features, such as endless count off and scrubbing (which lets you hear the music as you drag across it), give the program a usability edge. Mar 95

WRITING TOOLS

★★★★ **Bookends Pro 3.1, Westing Software, 415/435-9343, $129.** Comprehensive database program catalogs and stores all of your reference material—actual quotes as well as citations. It's a useful tool that researchers will appreciate. Mar 95

★★★★ **EndNote Plus 2.0, Niles & Associates, 510/649-8176, $299.** Despite its power, this indispensable bibliography and citation manager is surprisingly easy to learn and use. If you have to work with references, it's a good choice. Apr 95

★★★ **FullWrite 2.01, Akimbo Systems, 617/776-5500, $395.** As the leanest of all high-end word processors, this product requires only 2MB of RAM. Its modular architecture is complex, but it's worth considering if you don't need to share files with the Word/WordPerfect crew. Apr 95

★★★ **Grammatik 6 for Macintosh, Novell, 801/225-5000, $49.95.** The low price, pleasant interface, and improved accuracy of this grammar checker make it worthwhile for a large number of quality-driven writers. It still misses some errors. Feb 95

★★★ **Inspiration 4.1, Inspiration Software, 503/245-9011, $195.** Writing tool allows you to move between words and diagrams to show the relationships between ideas. This version adds improved keyboard controls, import and export capability, plus more. Apr 95

★★★ **Microsoft Word 6.0, Microsoft Corp., 206/882-8080, $339.** If you can put this word processor's new features—including cross-referencing, AutoText, automatic numbering, macros and more—to work and you have a Quadra 650 or faster Mac, take the plunge. If you have a slower 68040 Mac, think twice; and if you have a 68030 Mac, don't even think about it. Feb 95

★★★ **Nisus Writer 4.0, Nisus Software, 619/481-1477, $495.** In a few specialized areas—such as mixing English and non-Romance languages—this word processing program is unmatched. However, for some high-end uses, such as table creation, it's a poor choice. Mar 95

★★ **Read-It O.C.R. Pro 5.0, Olduvai Corp., 305/670-1112, $395.** Although this OCR software has a nice collection of features, its recognition engine isn't up to par. It's not a first choice unless you simply need to process piles of very clear Courier text. Apr 95

★★★ **TextBridge 2.0, Xerox Imaging Systems, 508/977-2000, $99.** Optical character recognition software is impressive on good documents and can be trained and automated. Sep 94

★★★ **Writing Coach 1.0, WritePlace Software, 503/484-6380, $89.** If you'd like help with your writing, this writing-skills tutorial could be a great investment. Skillfully worded worksheets assist with planning, organizing, and revising. Dec 94

continues

Is it an exhibition if you can
rave until dawn?

Can you **move forward** in time without aging a day?

Is it a **party** if you **can't catch** your breath?

Are you dreaming if your eyes are wide open?

Is it possible to
expect the unexpected?

Will you ever recover
if you miss this event?

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Star Ratings

Hardware

INPUT DEVICES

★★★★ **ArtPad, Wacom Technology, 206/750-8882, $199.** Measuring less than 7 by 7½ inches, this pressure-sensitive tablet is sheer convenience if you're looking for a device that you can hide away one moment and readily exhume the next. Apr 95

★★★★ **DrawingSlate II, CalComp, 602/948-6540, $395.** A responsive stylus and user-definable macros make this digitizing tablet an excellent choice for artists and illustrators. Jun 95

★★★★ **FlightStick Pro for Macintosh, CH Products, 619/598-2518, $129.95.** The authentic feel of this joystick, along with well-conceived software, make it a nearly perfect desktop pilot's companion. Dec 94

★★★ **GlidePoint, Alps Electric, 408/432-6000, $99.** If you find moving the mouse a pain in the arm, you might want to try this alternative pointing device, which lets you position the cursor by moving your finger across its surface. Jul 95

★★★★ **Mac Keyboard Deluxe, MicroSpeed, 510/490-1403, $125.** If you're in the market for a new or replacement keyboard, this one, which is both smaller and lighter than Apple's Extended Keyboard, is worth considering. It has four ADB ports. Nov 94

★★★ **MacAlly, The Mace Group, 213/780-6110, $49.** It may not be a better mouse, but it's a cheaper one. This ADB mouse doesn't stand out from the crowd, but it's durable, glides smoothly, and won't leave a big hole in your pocketbook. Jul 95

★★★ **Mouse Deluxe Mac, MicroSpeed, 510/490-1403, $69.** The extra buttons of this mouse offer several features that Apple's mouse doesn't match, but its shape may not suit everyone's taste. Mar 95

★★★★★ **PaperPort, Visioneer, 415/812-6400, $399.** The paperless office is actually here. This clever combination of elegant hardware and intelligent software makes it easy to capture, organize, and retrieve documents. Once a page is scanned in, you can annotate it; run it through OCR software; or print, fax, or E-mail it. May 95

★★★ **QuePoint, MicroQue, 801/263-1883, $149.** Tired of shoving a mouse around? Slide your finger across this tiny input device to manipulate the cursor with a minimum of movement. May 95

★★★ **Remote Point, InterLink Electronics, 805/484-1331, $199.** Although it may not be a first choice for desktop work, this infrared pointing device is an elegant workaround for users who don't want to (or can't) be tethered to their Macs. Apr 95

★★★★ **Thinking Mouse Macintosh ADB, Kensington Microware, 415/572-2700, $139.95.** A mouse is a mouse is a mouse. Not so. This one has four programmable buttons that you can use—with the accompanying software—to automate such tasks as selecting commands or typing text. May 95

MISCELLANEOUS HARDWARE

★★★★ **AirNote 1.0 (1.1), Notable Technologies, 510/208-4400, $299.** Remote-messaging service lets you originate alphanumeric paging messages from your own computer, eliminating both dictation charges and errors in translation. It's a very handy way to get into alphanumeric paging. Dec 94

★★★ **Apple PCMCIA Expansion Module, Apple Computer, 408/996-1010, $219.** Well-integrated, well-designed unit offers 500-series users an efficient and easy albeit expensive way to add features to their PowerBooks. If you can overlook the early-adopter prices (a big if), the PC Cards are great expansion options—lightweight, low-power, and high-performance. Mar 95

★★★★ **Colortron, Light Source Computer Images, 415/925-4200, $1195.** Getting the colors on your screen to match those in your printed output is now easy and affordable, thanks to this hand-held spectrophotometer, which measures both transmissive and reflective sources. Jun 95

★ **EAB401P Speakers, Panasonic Communications & Systems, 800/742-8086, $99.** Small, inexpensive speakers provide less-than-state-of-the-art performance. The audio is thin and reedy. Apr 95

★★ **EAB701P Speakers, Panasonic Communications & Systems, 800/742-8086, $249.** The sound of these speakers is thin and slightly harsh, although they are attractive in a high-tech sort of way. Apr 95

★★★★ **MMS557, Audio-Technica USA, 216/686-2600, $149.95.** Among a huge selection of similarly priced speaker systems, these stand out as a best buy. They look good, as well as sound good. Apr 95

★★★★ **MultiSpin 4Xe, NEC Technologies, 708/860-9500, $515.** With its competitive price, free tech support, and two-year warranty, this quad-speed CD-ROM player is ready to race. Feb 95

★★ **NEC AudioTower, NEC Technologies, 800/632-4636, $99.** Looks great; sounds mediocre. Although this speaker system provides a convenient jack for an external CD drive, the sound quality is nothing to shout about. May 95

★★★★ **Photo Engine, Radius, 408/541-6100, $1099.** Photoshop acceleration hardware's suite of four 66MHz 32-bit DSP chips offers sufficient processing power to speed up 25 Photoshop functions on the most sophisticated systems, including Power Macs. Feb 95

★★★★ **Reno Portable CD-ROM Player, MediaVision, 510/770-8600, $349.** Have CD-ROM, will travel. This portable player is lightweight, versatile, and easy to set up; about the only complaint is its short battery life. Jun 95

★★★★ **SCSI Sentry, APS Technologies, 816/483-6100, $79.95.** Although the price of this terminator may seem steep, this device may well be the cure for SCSI woes. Our reviewer heartily recommends it. Sep 94

★★★★ **Vivace, Coda Music Technology, 612/937-9611, $2295.** As an intelligent and endlessly patient accompanist, this music study system for wind instruments may be the best thing that's happened to learning wind literature since the metronome. Jan 95

★★★★ **YST-SS1010, Yamaha Corporation of America, 714/522-9240, $349.95.** With a name like YST-SS1010, you have to be good. And it is. This satellite-and-subwoofer speaker system is highly recommended, despite its mediocre manual. Jul 95

MODEMS/NETWORK HARDWARE

★★ **Cooperative Adapter, Photonics Corp., 408/955-7930, $449.** The high cost of each unit, the limitations and restrictions inherent in diffuse infrared, and the extremely low cost of traditional LocalTalk adapters and cabling make this infrared network interface an expensive niche product. Dec 94

★★★ **DaynaPort Pocket SCSI/Link, Dayna Communications, 801/269-7200, $299 to $369.** Inexpensive, lightweight SCSI-to-Ethernet connector works with both desktop Macs and PowerBooks and can use the Mac's ADB port as a power source. Nov 94

★★★ **FastSwitch 10, Grand Junction Networks, 510/252-0726, $6250.** Switched Ethernet hub is a great solution for networks that handle large amounts of data traded peer-to-peer, but if your network consists of E-mail and a file server, you probably won't see much benefit in stepping up to switched Ethernet. Dec 94

★★★ **OneWorld Fax, Global Village Communication, 408/523-1000, $999.** Easy-to-use network fax product lets an office share fax-sending resources without dedicating a hard drive and CPU. Aug 94

★★★★ **OneWorld Internet 1.0, 700 Series, Global Village Communication, 408/523-1000, $1699 plus monthly fee.** Users of an office network can connect to the Mother of All Networks with this Internet gateway. It offers E-mail and direct Internet access in an approachable format. Jun 95

★★★ **Pocket EtherTalk Adapter, Xircom, 805/376-9300, $349 to 399.** All-in-one SCSI-to-Ethernet connector is lightweight and works with desktop Macs and PowerBooks. Nov 94

★★★★ **PowerPort Mercury/PB 500 Series, Global Village Communication, 408/523-1000, $399.** Top-notch fax modem is capable of exemplary fax and data communications performance. Nov 94

★★★ **Spectra-Com P192mx, Bay Connection, 408/270-8070, $169.** If you must have absolute portability and AC power isn't available, this pocket data/fax modem can do the job. It's not that much smaller than a regular desktop modem, however. Oct 94

★★★★ **SupraFaxModem 288, Supra Corp., 503/967-2410, $274.95.** This 28,800-bps fax modem is a very good performer, and the price of admission isn't steep. Combined with fast, stable fax software and a good terminal program, it's hard to beat. Aug 94

PRINTERS

★★★★ **Apple Color StyleWriter 2400, Apple Computer, 408/996-1010, $525.** Economical, QuickDraw-based color ink-jet printer offers gorgeous color output plus fast black-and-white printing. If you don't need DOS/Windows compatibility, it's a good buy. Apr 95

★★★★ **HP LaserJet 5MP, Hewlett-Packard, 800/752-0900, $1299.** This laser printer meets the high demands of small businesses and home offices with features such as 600-dpi resolution, support for Adobe PostScript Level 2, and automatic-input switching. Memory Booster software makes good use of the printer's 3MB of RAM. Jul 95

★★★★ **LaserWriter 16/600 PS, Apple Computer, 408/996-1010, $2399.** If speed is what you need, this fine printer is it. The price is reasonable. Mar 95

★★★ **P-Touch PC, Brother International Corp., 908/356-8880, ext. 4307, $449.95.** Versatile label printer is easy to set up and use, and produces high-quality output. The cost per label is high, though, and the documentation is weak. Sep 94

★★★ **Phaser 140, Tektronix, 503/627-7111, $1695.** If you're looking for a capable color printer for a small workgroup, this ink-jet is a great choice. It provides only 17 resident fonts, however. Apr 95

★★★ **Pictura 310, Fargo Electronics, 612/941-9470, $4995; optional Adobe Level 2 PostScript package $795.** While this tabloid-size thermal-wax and dye-sublimation printer is affordable and produces acceptable print quality, it's not to dye for. Its substandard color-matching capabilities don't measure up to those of its competitors. Jul 95

continues

XPrint Color Laser Printers — Technical View

XPrint Color Laser Printers — Practical View

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Circle 100 on reader service card

Star Ratings

★★★★ **PowerPrint 2.5 (2.5.2), GDT Softworks, 604/291-9121, $149.** Ingenious hardware-software combo lets the Mac print to almost any PC printer. It supports over 1000 printers—from aging dot matrix models to the newer color ink-jet and laser printers. Sep 94

★★★ **PrimeraPro, Fargo Electronics, 612/941-9470, $1895.** The photo-realistic output of this thermal-wax and dye-sublimation printer beats that of any other printer in the price range. But with expensive consumables and slow print time, it's best suited for routine thermal-wax use and occasional dye-sub work. Jan 95

★★★★ **Stylus Color, Epson America, 310/782-0770, $699.** This color ink-jet printer is no speed demon at 720-dpi resolution, you need special paper for hi-res output, and it offers no color correction. But who cares? The print quality is superb and the price is reasonable. May 95

SCANNERS

★★★ **Fujitsu ScanPartner Jr., Fujitsu Computer Products of America, 408/432-6333, $499.** Compact scanner with good OCR software makes converting hard-copy documents to editable text a snap. While it's an economical and fuss-free scanning solution, its page feeder doesn't offer the paper-size and -shape flexibility of a flatbed scanner. Jul 95

★★ **Pro Imager 4000, PixelCraft, 510/562-2480, $2995.** This midrange scanner delivers excellent highlight detail but produces a lot of noise in shadow areas. It doesn't measure up to similarly priced competitors in speed or image quality. Jun 95

★★★★ **Pro Imager 8000, PixelCraft, 510/562-2480, $12,995.** Demanding prepress users will like this scanner's tonal sensitivity, high resolution, large image area, and impressive speed. Although its color-adjustment software needs work, this is a superb scanner. Jun 95

★★★ **Reli 4830T, Relisys, 408/945-9000, $1699.** The good: high-quality scans, midrange price; lots of bundled software. The bad: slow performance, quirky scanning software. The upshot: If you can live with the cons, this scanner is a bargain. Jun 95

★★★★ **SprintScan 35, Polaroid, 617/386-2000, $2495.** Compact, efficient scanner offers a cost-effective way to transfer images from 35mm slides or negatives to a Mac. Jun 95

★★★ **Vista-S8, Umax Technologies, 510/651-8883, $995 (LE+); $1095 (Pro+).** This 24-bit color flatbed scanner has a lot of useful features for its low price, including crisp line-art scans and speedy previews. It's a bargain if you can overlook its slow OCR scanning and some scanning-software bugs. Jul 95

SYSTEMS/STORAGE

★★★★ **Alacrity PM 6100, KS Labs, 614/374-5665, $165.** Installing a clock booster is the quickest, easiest, and cheapest way to extract more power from Apple's entry-level Power Mac. Oct 94

★★★★ **Brainstorm Accelerator for the Macintosh SE, Brainstorm Products, 415/988-2900, $199.** Your SE will never be a Power Mac or even a IIsi, but if your budget won't buy a new Mac, you can't do better than this accelerator, which pushes an SE's speed to close to a Classic II's in overall performance. Mar 95

★★★ **Conley SR2 RAID System, Conley Corp., 212/682-0162, $21995.** While RAID technology is typically praised for its fault-tolerance rather than its speed, this high-performance storage system proves that you can have both. Sep 94

★★★ **Joule System, La Cie, 503/520-9000, Price varies by component.** Plug-and-play tower lets you stack drives—including hard drives, removable media, and other modules—atop a base unit, making it easy to buy extra storage or swap modules with other Joule towers. Joule drive prices are generally slightly higher than for comparable drives, however. Feb 95

★★★ **Newton MessagePad 110, Apple Computer, 408/996-1010, $599.** Personal digital assistant has improved handwriting recognition, more memory, longer battery life, and a more efficient design. Aug 94

★★★★ **OrangePC Model 200 Series, Orange Micro, 714/779-2772, $1139 to $3237.** If your goal is to get a Mac that runs Windows as fast as a PC, you can't get there from here. If your goal is to get business-level performance for day-in, day-out use, these PC coprocessor cards are your best choice. Aug 94

★★★★ **PLI Infinity 270 Turbo, PLI, 510/657-2211, $599.** This 270MB SyQuest drive is fast, reliable, and a very good product. The cost of the medium is competitive with that of optical drives. Sep 94

★★ **PowerBook 150, Apple Computer, 408/996-1010, $1449.** Fast, lightweight portable is minimalist in the extreme, with no video-out, ADB, Ethernet, or microphone. Unfortunately, the price is less minimalist, and most budget-conscious shoppers would be better off buying a used or discontinued model. Dec 94

★★★ **PowerBook 540c, Apple Computer, 408/996-1010, $4839.** The prestige PowerBook du jour, this sleek, curvy and futuristic-looking notebook makes a good computer for both on-the-road and in-the-office use. Its nonstandard battery, memory, and Ethernet ports are not ideal features, however. Oct 94

★★★★ **PowerBook Duo 280c, Apple Computer, 408/996-1010, $3759.** If you travel a lot, this notebook computer is the best Mac to get. It offers close to the power of a Quadra 650 in a subnotebook. Oct 94

★★ **PowerBook Duo Dock II, Apple Computer, 408/996-1010, $969.** Apple has added Ethernet to this full-featured docking station, but installing NuBus cards is still absurdly difficult. Oct 94

★★★★★ **Power Macintosh 7100/66, Apple Computer, 408/996-1010, $2899.** Midrange Power Mac makes an outstanding workstation whose power should last for several years. The price is nothing to take lightly, but this system delivers every dollar's worth. Aug 94

★★★ **Power Macintosh 8100/110, Apple Computer, 408/996-1010, $6379.** High-end users who have invested heavily in NuBus cards can protect their investment with this top-of-the-line Power Mac. Mar 95

★★★★ **Power Macintosh 8100/80, Apple Computer, 408/996-1010, $4249.** While this system doesn't quite offer the excellent price/performance ratio of the other available Power Macs, you should consider it if you're a high-end user moving your work over to RISC-based computing. Aug 94

★★★ **Power Macintosh Upgrade Card, Apple Computer, 408/996-1010, $699.** Current 33MHz 040 machines will get the best bang for the buck with this card. However, other Macs won't realize as much of a performance gain. Oct 94

★★★★ **Quadra 630, Apple Computer, 408/996-1010, $1279.** Fast, inexpensive, expandable 33MHZ 68040 machine may be the last 680X0-based desktop Macintosh, but it's one of the best entry-level Macs ever. Nov 94

★★ **RCD-1000, Pinnacle Micro, 714/727-3300, $1695.** The software for this CD-Recordable drive is easy to use, but it's too unreliable to use as a day-to-day backup system. Jun 95

★★★★ **Zip Drive, Iomega, 801/778-1000, $199.95; 100MB cartridge $19.95.** Weighing in at about a pound, this external drive combines speedy performance, convenience, and economy in an attractive package. It uses 100MB cartridges the size of a floppy disk, and boasts near hard-drive speeds. What's not to like? Jul 95

VIDEO/DISPLAY

★★★ **Apple Macintosh Display Card 24AC, Apple Computer, 408/996-1010, $1579.** 24-bit accelerated graphics card offers a satisfactory price/performance ratio, although it can't switch resolutions from the keyboard. Oct 94

★★★★ **Apple Multiple Scan 15 Display, Apple Computer, 408/996-1010, $509.** The tridot tube of this 15-inch monitor provides a sharp and accurate image, but reflects some glare. The built-in stereo speakers reproduce sound nicely. Feb 95

★★★★ **FlexCam, VideoLabs, 612/988-0055, $595.** Small, unobtrusive desktop video camera has a flexible gooseneck for positioning. Dec 94

★★★ **L-TV Portable, Focus Enhancements, 617/938-8088, $229.99.** Sturdy, inexpensive, external TV-converter plugs into your Mac and converts video output to NTSC. Aug 94

★★★ **L-TV Pro NuBus, Focus Enhancements, 617/938-8088, $299.99.** NuBus card converts your Mac's RGB video signal to NTSC so you can use your Mac with a TV or VCR. Aug 94

★★★★ **Multiscan 15sf, Sony Computer Peripheral Products, 408/432-0190, $569.95.** Trinitron monitor has a flat screen that displays sharp, bright, and accurate images. With good antiglare coating and adjustable image tilt, it's worth looking at. Feb 95

★★★★ **MultiSync 3V Monitor, NEC Technologies, 708/860-9500, $495.** With a bright display and great image quality, this monitor delivers a fine picture at a moderate price. Feb 95

★★★★ **Panelight ZX, Panelight Display Systems, 415/772-5800, $3995 to $4695.** LCD panel offers vivid images at a comparatively low price. It's a great choice for presenters. Mar 95

★★★ **The Presenter Plus Mac/PC, Consumer Technology Northwest, 503/643-1662, $429.** Small, external TV-converter supports output to television from most Macs with built-in video. Aug 94

★★★ **QA-1500, Sharp Electronics Corporation, 201/529-8731, $5795.** LCD panel's display is crisp and flicker-free, but placing a presentation on its PC Card is cumbersome. Cheaper products are available. May 95

★★★★ **QuickCam, Connectix Corp., 415/571-5100, $149.95.** For as little as $99 (street price), this tiny, fun, easy-to-use, digital video camera lets users experiment with video input for making QuickTime movies or capturing still images. Mar 95

★★★★ **SpigotPower AV, Radius, 408/541-6100, $999.** Make full-screen, 30-fps movies with this first-rate video-compression-and-decompression board and accompanying JPEG software. Jun 95

★★ **Tornado Graphics Card, Mirror Technologies, 612/832-5622, $699.** Inexpensive 24-bit accelerated graphics card has zoom and pan options but is relatively slow. Oct 94

★★★ **VideoDirector 1.5, Gold Disk, 408/782-0200, $199.95.** Low-end video-editing system lets you log, edit, and organize videotape footage, copying selections from a source deck to a record deck. A good choice for nonprofessionals. Jun 95

Streetwise Shopper

SPECIAL HARDWARE AND SOFTWARE BUYING OPPORTUNITIES

Selected and edited by Charles Barrett

The following listings include both time-sensitive promotions and open-ended offers being sponsored by Macintosh vendors and their resellers. Each listing indicates which products have been awarded a star rating in *Macworld's Reviews* (products rated ★★ or lower are not eligible for inclusion), have been selected as an Editors' Choice, or have won a World-Class award. In some cases, the editorial evaluation quoted is for an earlier product version. The ◀ symbol indicates that the product is Power Mac related. Except where otherwise indicated, prices given are suggested retail prices.

When placing an order, please mention that you saw the offer in *Macworld*. Should any problems arise, contact the *Streetwise Shopper* editor by fax (415/442-0766), phone (415/978-3241), or mail (*Macworld*, 501 Second St., San Francisco, CA 94107).

Vendors and resellers desiring to have products and services included in this section are encouraged to contact the *Streetwise Shopper* editor with particulars.

BUNDLES

Diamond Scan or Pro + Diamond Control + DiamondMatch Mitsubishi Electronics America is including two software packages free of charge with its $1750 Diamond Scan 20H, $1199 Diamond Pro 17TX, and $2275 Diamond Pro 21TX color monitors for DTP, CAD/CAM, and graphic-design applications. Diamond Control permits users to make all monitor adjustments on screen, while the DiamondMatch Color Calibrator Kit matches screen colors with printer output. Call 800/843-2515 for more information.

QuickMail + QuickMail WAN Gateway CE Software is including MPACT Immedia's QuickMail WAN software and a coupon waiving the $50 onetime subscription fee for Immedia's common store-and-forward-mechanism service in every package of its QuickMail electronic-mail system (Jan 95 ★★★ for QuickMail 3.0) at no additional cost. QuickMail WAN provides seamless connectivity between offices using QuickMail and other messaging systems. Call 800/523-7638 for more information.

SummaJet 2C Ink Jet Plotter + Ink Supplies or Media Summagraphics is offering customers who purchase a specially labeled SummaJet 2C wide-format color plotter their choice of either $550 worth of ink supplies (one color and three monochrome print heads with ink refill kits, plus two spare mono refill kits) or $550 worth of media (200 sheets of translucent bond paper, 300 sheets each of opaque bond paper and vellum paper, and 50 sheets of Mylar film). Customers who trade in any working D- or E-size pen plotter qualify for an additional $550 in ink supplies. Call 800/337-8662 for more information. *Offer expires 7/31/95.*

◀ SuperCard 2.0 + ◀ Ray Dream Designer 3.1.1 + ◀ Kai's Power Tools 2.1 SE + ◀ Color It 3.0 LE Allegiant Technologies is bundling the following software free of charge with its $695 authoring system (Feb 95 ★★★★ for SuperCard 1.7.1): the $349 Ray Dream Designer 3-D graphics program (Mar 95★★★); a special edition (15 filters only) of HSC Software's $199 collection of plug-in extensions for such applications as Adobe Photoshop and Fractal Design Painter (May 94 ★★★★★ for Kai's Power Tools 2.0a); and a limited edition (12 filters only) of MicroFrontier's $149.95 Color It 32-bit paint and image processing program (Aug 95 ★★★★). Whole bundle available from resellers such as MacConnection (800/800-0002) and MacWarehouse (800/225-6227) for about $399. The three bundled programs are available direct for $149 to current SuperCard 2.0 owners who call Allegiant at 619/587-0500. *Offer expires 8/31/95.*

Zip Drive + Zip Tools Iomega includes a 100MB Zip Tools cartridge free of charge with its $199.95 Zip drive (Jul 95 ★★★★). Zip Tools includes a Zip version of SunStar Publishing's $59.95 Personal Backup utility and an abbreviated version of Continuum Software's $79.98 VirtualDisk Starter disk-cataloging utility. A demo version of Continuum's DiskDupPro for duplicating Zip disks, plus demos of Bungie Software's Marathon and Pathways games, are also included. Call 800/697-8833 for more information.

SIDEGRADES/UPGRADES

◀ Color It 3.0 MicroFrontier is offering this $149.95 32-bit image processing and paint program (Aug 95 ★★★★ for version 3.0b1) to registered users of selected programs such as Photoshop, QuarkXPress, Microsoft Word, and ClarisWorks for $49.95. Call 800/388-8109 with your program serial number to order. *Offer expires 8/31/95.*

◀ DeltaGraph Pro 3.5 DeltaPoint is offering this $195 charting and graphing package (Apr 94 ★★★★ for 680X0 version 3, 1993 World-Class) for $79.95 to registered users of competing products. Call 800/222-2808 for more information.

HP JetDirect Print Servers Hewlett-Packard is offering a $100 ($150 for Canadian customers) rebate on the purchase of any HP JetDirect print server with the trade-in of an older HP model. These print servers feature flash memory and multiprotocol support, and they come with HP JetAdmin and HP JetPrint software for remote management and printer-status feedback. Call 800/789-6239 for more information. *Offer expires 10/31/95.*

◀ LS Fortran Language Systems' $695 ANSI F77 compiler is available for $375 to owners of competitive products. The compiler has extensions from high-performance machines such as VAX, Cray, and Data General. It includes two source-level debuggers and generates optimized code for standard Macs and Power Macs. Call 703/478-0181 to order.

◀ MacWrite Pro 1.5 Claris is offering this $99 word processor (May 94 ★★★★) for $69 to registered users who upgrade from competitive products. Call 800/544-8554 for more information.

SPARCprinter E Sun Microsystems is offering a $1000 discount on this $2995 color laser printer—which outputs resolutions of 300, 600, or 1200 dpi at rates of up to 12 pages per minute— to customers who trade in their original SPARCprinter or selected Apple, QMS, or HP laser printers. Call 800/952-7427, ext. 200, for more information. *Offer good until 7/31/95, or while supplies last.*

SPECIAL DISCOUNTS/REBATES/OFFERS/RESOURCES

eWorld Apple Customer Center Apple Computer is now offering direct customer support for all the company's products via its eWorld online service (eWorld software is preinstalled on every new U.S. Macintosh). Customer support features access to product information, a forum for posting technical questions (which will be answered within 24 hours), discussion boards for customer-to-customer interaction, and a forum for product developers. Call 800/775-4556 for more information and to obtain free eWorld software.

◀ In Control for Workgroups Attain is offering a $299.90 two-user starter pack of this group-scheduling software (Oct 94 ★★★★ for In Control 3.0.4 personal organizer) for an introductory price of $199.95. Call 800/925-5615 for more information. *Offer expires 7/31/95.*

Macintosh Product Registry & World of Macintosh Multimedia Redgate Communications is combining (effective 7/1/95) these publications into a single sourcebook (also published in CD-ROM and online versions) containing over 8000 multimedia and Macintosh product descriptions. Distributed quarterly at $14.95, this sourcebook is available at such retail outlets as B. Dalton's, Waldenbooks, and CompUSA. Call 800/333-8760 for more information and to order a subscription.

MessagePad 120 Apple Computer is offering a $50 rebate with the purchase of this PDA between 5/1/95 and 7/31/95. Rebates will be increased to $100 when an eligible accessory (Newton Connection Kit 2.0, external or PCMCIA fax modem, 2MB or 4MB flash storage card, Newton Print Pack, battery-charging station, leather zip case, or Newton enhancement pack) is purchased at the same time. Rebate coupons are available at MessagePad 120 point-of-purchase displays and via online services. Call 800/909-0260 for more information. *Offer expires 8/31/95.*

OpenDialog FGM is offering this $259 set of programming libraries, which is designed to make the creation of dialog boxes easier, for an introductory price of $99. Call 703/478-9881 for more information and to order. *Offer expires 8/31/95.*

Phyla 1.0 Mainstay is offering this $495 object-oriented database (Aug 95 ★★★) for $299. Call Mainstay at 800/484-9817 (code 4636) for more information and to order. *Offer expires 7/31/95.* m

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Best Computer Newspaper (Circulation more than 100,000)

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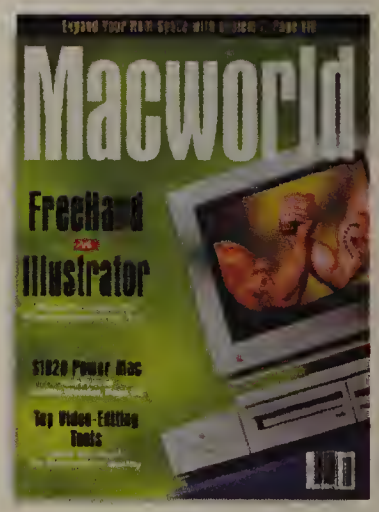
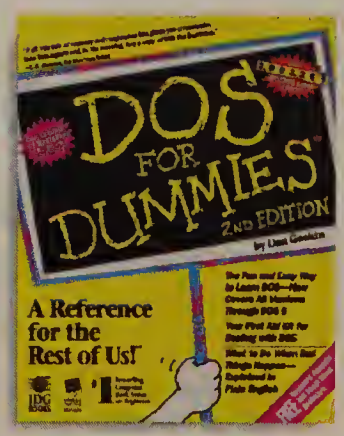
Best Computer Columnist (Deborah Branscum, "Conspicuous Consumer")



Best Advanced How-to Book: Systems



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156	Agfa	43	800/685-4271
10	Agio	—	800/688-2446
196-197	Alliance Peripheral Systems	62	800/874-1428
165-166	America OnLine	—	800/827-6364
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141	CompuServe	66	800/848-8199
47	Computer City	240	800/THE CITY
220-221	Computer Discount Warehouse	2	800/861-4CDW
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21	Deneba Software	57	800/733-6322
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214	DigiCore	269	800/858-4622
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223	Direct Connections	121	800/572-4305
222	Direct Tech	298	800/279-5520
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Product Index

A quick and easy product index from Macworld. Simply use this index to find the page or advertiser of the products which interest you. Then, use the reader service number for our FastFacts Product Information Card located on the following page.

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For faster results just fax this sheet to +1-413-637-4343. Please indicate your fax number where indicated.

Please answer these questions so that we may better serve you.

A. Including yourself, approximately how many people are employed at your entire work-site (i.e., employees in your office, building, or cluster of buildings)? (Check one.)

- 01 ❑ 1000+
- 02 ❑ 999 - 100
- 03 ❑ 99 - 25
- 04 ❑ Under 25

B. Which of the following computers are installed at this entire work-site? (Check all that apply.)

- 05 ❑ Apple Workgroup Servers/ Mac Quadra-series
- 06 ❑ Mac Centris-series/II-series/LC III/ Performa 600/450/SE 30
- 07 ❑ Mac LC/LC II/Performa 430/405/ 400/200/Classic-series/SE/Plus/ 512K/128K/Portable
- 08 ❑ Mac PowerBook-series/Duo-series

C. What is the total number of Macs installed at this entire work-site? (Check one.)

D. For how many Macintosh computers within this entire work-site do you have purchase involvement for products and/ or services? (Check one.)

	C	D
500+	❑ 09	❑ 15
499 - 100	❑ 10	❑ 16
99 - 50	❑ 11	❑ 17
49 - 10	❑ 12	❑ 18
9 - 1	❑ 13	❑ 19
None	❑ 14	❑ 20

E. In which ways are you ever involved in purchase decisions for Macintosh products at this entire work-site? (Check all that apply.)

- 21 ❑ Initiate/Determine need for product/capabilities/features
- 22 ❑ Evaluate, recommend, or approve brands/models
- 23 ❑ Evaluate, recommend, or approve purchase source
- 24 ❑ Authorize purchases

F. Over the next 12 months, how much will this entire work-site spend on Macintosh products and/or services? (Check one.)

- 25 ❑ $1 million or more
- 26 ❑ $999,999 – $500,000
- 27 ❑ $499,999 – $100,000
- 28 ❑ $99,999 – $50,000
- 29 ❑ $49,999 – $10,000
- 30 ❑ Under $10,000

G. Considering the entire work-site, which of the following Macintosh hardware and software products are currently installed? (Check all that apply.)

- 31 ❑ Business software (Word processing, spreadsheet, database, etc.)
- 32 ❑ Graphics/publishing software
- 33 ❑ Monitors/displays
- 34 ❑ Printers/scanners
- 35 ❑ Networking/communications hardware and/or software
- 36 ❑ Multimedia/AV hardware and/or software
- 37 ❑ Mobile computing products (PowerBooks, peripherals, software, etc.)

H. What is your primary job function? (Check one.)

- 38 ❑ Computer Reseller/VAR/VAD
- 39 ❑ MIS/DP/IS/Network Management
- 40 ❑ Engineering
- 41 ❑ R&D/Scientific
- 42 ❑ Corporate/General Management
- 43 ❑ Accounting/Finance
- 44 ❑ Marketing/Sales/PR/ Communications
- 45 ❑ Art/Design/Creative Services

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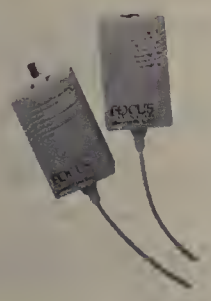

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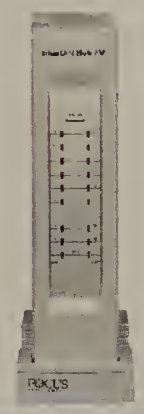

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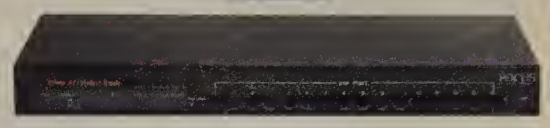

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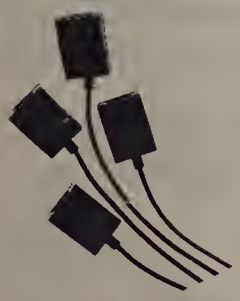

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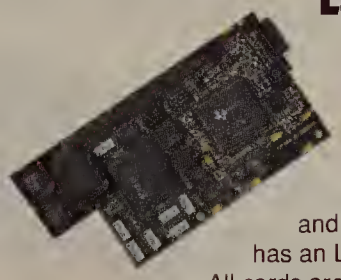
Lapis Color LC 2421 for LC



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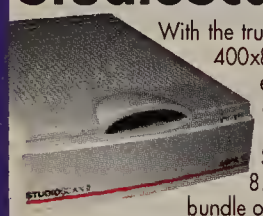

With the true optical resolution of StudioScan II at 400x800 and interpolated to 2400, image enlargements are possible, and printed results are crisp and sharp. StudioScan II has 30 Bit Color Scanning and 10 Bit Grayscale with a 8.5 x 14" scanning area. A complete bundle of software is included for Macintosh® - FotoSnap, FotoLook, FotoTune Light, which includes the industry standard IT8 color calibration chart. Adobe™ Photoshop™ LE completes the bundle, providing the facility for creative image manipulation.

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Turbo™ 601

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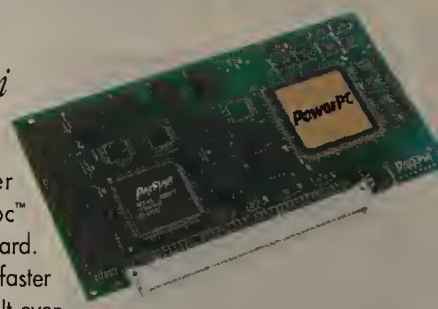

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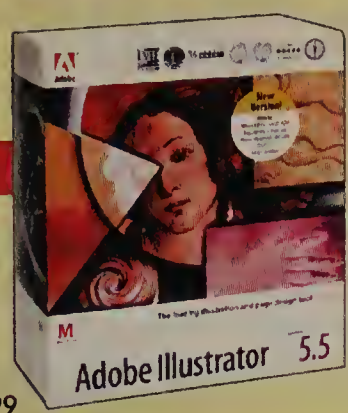

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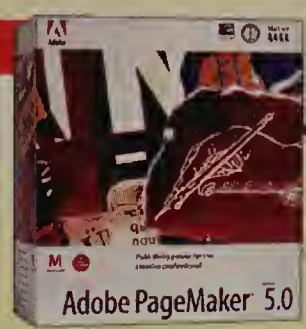

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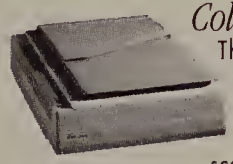

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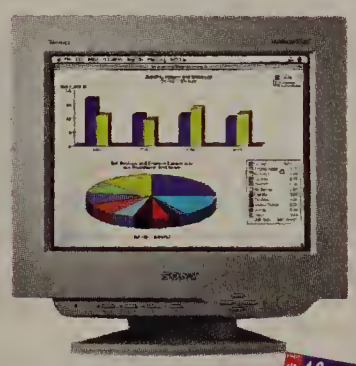

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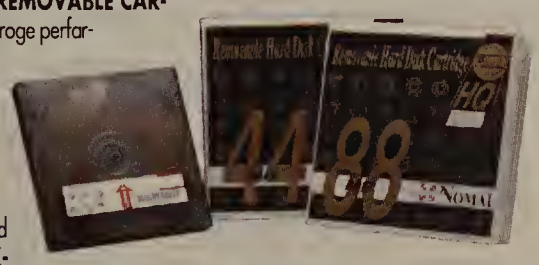

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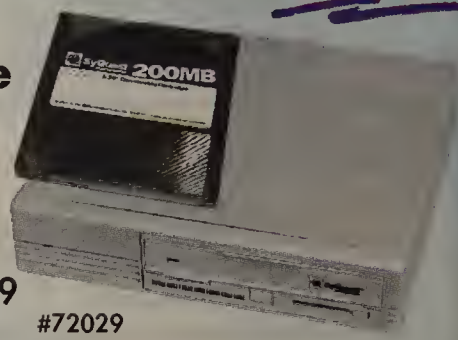

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230 Optical Cartridge	$29
128 Optical Cartridge	$24

Best Value

	Drive Cost	Media Cost (10 pack)	Cost per MB
230 MB Optical	$399	$290	29¢
Zip Drive	$199	$150	34¢
SyQuest 270	$399	$630	38¢
SyQuest 200	$419	$790	60¢
1GB Hard Drive	$699	-	69¢
SyQuest 88*	$359	$470	94¢
SyQuest 44*	$199	$430	$1.46

* Discontinued products. Cost per megabyte is figured from drive cost plus ten cartridges.

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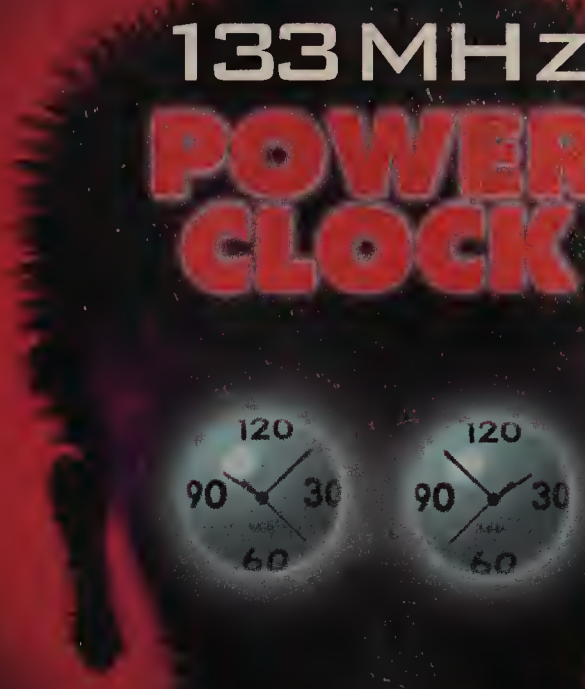

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APS Q 1080

- ✔ Formatted capacity over 1GB for all your data-intensive needs
- ✔ Average seek time of 9.8 ms and access time of 17 ms
- ✔ 3-year warranty

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APS Q 730/Q540

- ✓ Today's best value for your storage needs
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APS Q 540 $199.95 *Internal configuration*

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349-2050MB

Model	Capacity	Internal	SR2000
APS Q 365[2] Quantum 365 Lightning	349MB	$159.95	$259.95
APS Q 540[3] Quantum 540 Fireball	516MB	$199.95	$299.95
APS Q 730[2] Quantum 730 Lightning	699MB	249.95	349.95
APS Q 840[3] Quantum 840 Trailblazer	811MB	299.95	399.95
APS Q 1080[3] Quantum 1080 Fireball	1042MB	349.95	449.95
MacUser ZD LABS APS ST 1.0[5] Seagate ST 31230N Hawk	1010MB	549.95	649.95
APS Q 1.0[5] Quantum Atlas XP31070	1025MB	699.95	799.95
MacUser ZD LABS APS MS 2.0[5] Micropolis 4221	1955MB	999.95	1099.95
APS ST 2.0[5] Seagate ST 32550N Barracuda	2047MB	999.95	1099.95
APS Q 2.0[5] Quantum Atlas XP32150	2050MB	999.95	1099.95
APS MS 2.0AV[5] Micropolis 4221AV	1955MB	1099.95	1199.95

4064-8669MB

Model	Capacity	Internal	SR2000
APS MS 4.0[5] Micropolis 3243	4064MB	$1399.95	$1499.95
APS MS 4.0AV[5] Micropolis 3243AV	4064MB	1499.95	1599.95
APS Q 4.0[5] Quantum Atlas XP34300	4101MB	1499.95	1599.95
MacUser ZD LABS APS ST 4.0[5] Seagate ST 1S1S0N	4094MB	1499.95	1599.95
APS MS 9.0[5] Micropolis 1991	8669MB	2299.95*	2499.95
APS MS 9.0AV[5] Micropolis 1991AV	8669MB	2399.95*	2599.95
MacUser ZD LABS APS ST 9.0[5] Seagate ST410800N	8669MB	2699.95*	2899.95

**External case is special Full Height only*

APS DISK ARRAYS (0-1)

Model	Capacity	RAID LEVEL	Price
ARRAID S2/5400[5]	2GB	Striped (0)	$1399.95
ARRAID S2/7200[5]	2GB	Striped (0)	1599.95
ARRAID S4/7200[5]	4GB	Striped (0)	2499.95
ARRAID S8/7200[5]	8GB	Striped (0)	3299.95
ARRAID M1/7200[5]	1GB	Mirrored (1)	1599.95
ARRAID M2/7200[5]	2GB	Mirrored (1)	2499.95

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Internal drives for Quadra 800 and Centris 610 available
1-5 Denotes length of manufacturer's warranty in years
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Model	Capacity*	Internal	External
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APS DAT 2²	4GB+	$749.95	799.95
APS HyperDAT²	8GB‡	949.95	999.95
APS DLT20²	20GB‡	—	3999.95
APS DLT40²	40GB‡	—	4999.95

NOW WITH TWICE THE CAPACITY FOR THE SAME PRICE

*Actual data compression and tape capacity vary greatly depending of the type of data recorded, other system parameters and environment.
+Native capacity without data compression.
‡ 2:1 Hardware data compression.

All APS DAT, DLT & HyperTape drives include Retrospect by Dantz

BEST VALUE!

Tape Media	1-4	5-19	20+
3080XLF (HyperTape)	$34.95	$32.95	$31.95
60-Meter	7.95	6.95	5.95
90-Meter	9.95	8.95	7.95
120-Meter (DD5-2)	19.95	18.95	17.95
DLT20 Data cartridge	45.95	—	—
DLT40 Data cartridge	109.95	—	—
DLT20 3PK Data cartridges	129.95	—	—

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APS 230 MO

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APS REMOVABLES

Model	Capacity	SR 2000
APS SQ 3270²	255MB	$479.95
APS SQ 5200²	194MB†	499.95

† Does not format 44MB & 88MB cartridges
All SyQuest drives include 1 FREE cartridge

BEST VALUE!

SyQuest Media	1-4	5-9	10+
SQ-400 (44MB) cartridge	$44.95	$43.95	$41.95
SQ-800 (88MB) cartridge	54.95	53.95	51.95
SQ-2000 (200MB) cartridge	84.95	83.95	81.95
SQ-310 (105MB) cartridge	59.95	58.95	56.95
SQ-327 (270MB) cartridge	64.95	63.95	61.95

Prices listed are for unformatted media

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- All prices and specifications are subject to change without notice.
- Refused orders subject to restocking fee.
- Hard drives include brackets, cables, cords and I.E.Ds required for operation with the specified Macintosh where applicable. All hard drives from APS Technologies come preformatted with Apple's System 7.0.1 software, and APS Technologies' APS POWER TOOLS SCSI formatter/hard disk partitioner.
- All external drive products and cases come with a premium 25 x 50 SCSI cable.
- International customers must pay for all shipping charges.
- Toll-free Technical Support as needed. Regular hours are 8 am to 8 pm Monday thru Friday, 9 am to 5 pm Saturday, Central Time.

APS MO DRIVES

Model		SR 2000
APS 230MB MO¹		$599.95
APS 1.3GB MO¹	New 4MB Cache	1999.95

NEW LOWER PRICES

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1-5 Denotes length of manufacturer's warranty in years

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MO Media	1-4	5-9	10+
128MB cartridge	$27.95	$26.95	$22.95
230MB cartridge	39.95	38.95	34.95
1.3GB cartridge	89.95	88.95	84.95

APS CD-ROM DRIVES

Model		SR 2000
APS T 3601¹	Quad-speed	$349.95

POWERBOOK DRIVES

Model	Capacity	Internal	***AC Only
APS Q 341¹	326MB	$299.95	N/A
APS Q 514¹	491MB	379.95	N/A
APS T 504¹	504MB	399.95	**$499.95
APS T 800¹	773MB	599.95	**699.95

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Internal configuration

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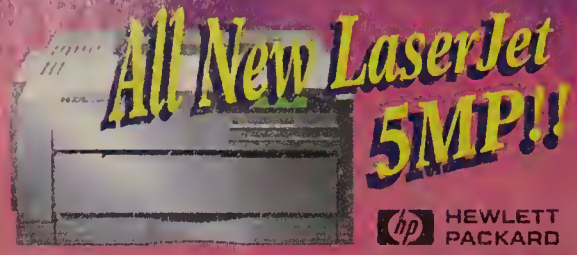

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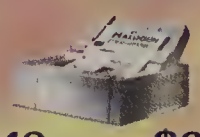

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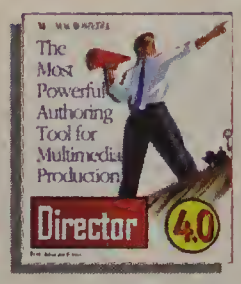

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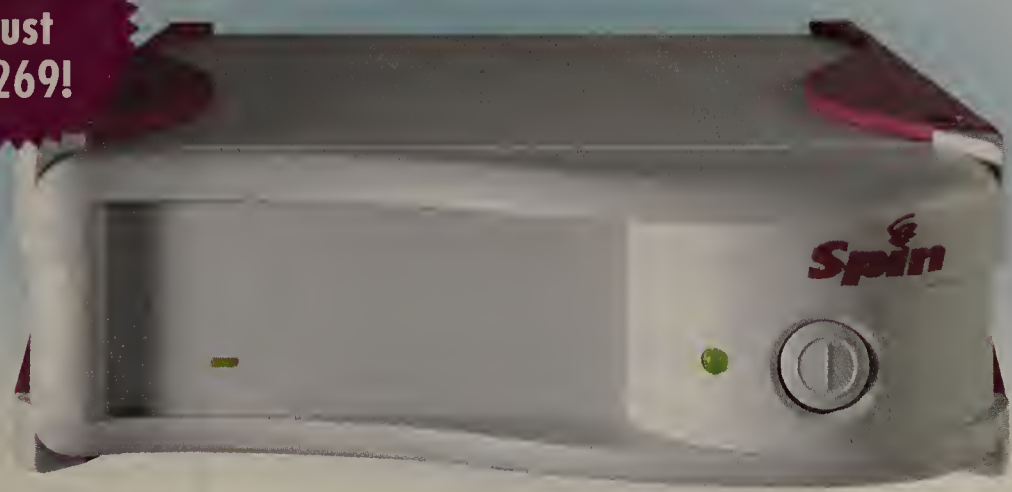

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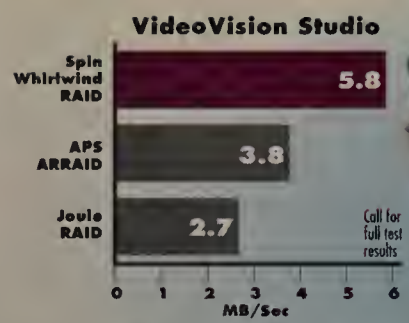

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8GB	$5399	$5599

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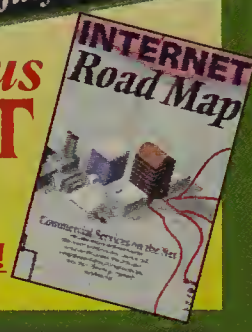

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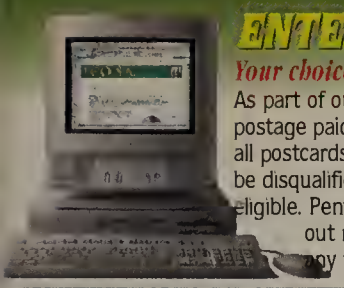

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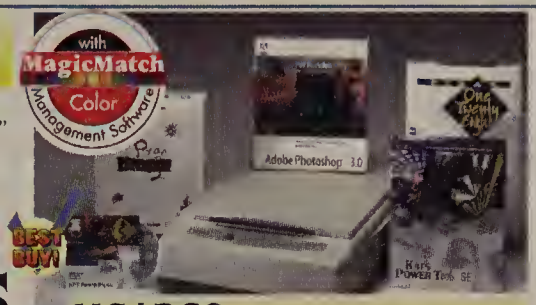

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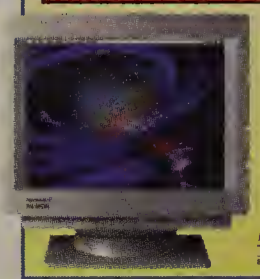

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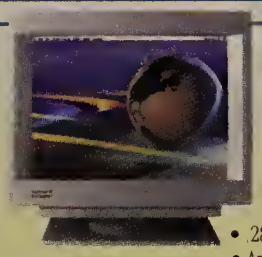

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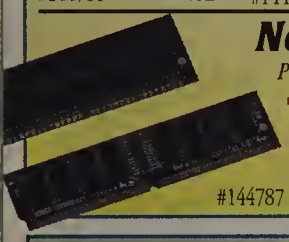
Newer Technology Mac Memory

Please call to verify current memory prices due to fluctuating costs.



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32MB 70ns #144788 **$1045**

16MB 60ns #144789 **$535**

MICROTEK

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MacUser RATED 4 NOVEMBER 1994

ScanMaker® III

Award winning, 36-bit 1200dpi scanner

Capable of scanning 12 bits per RGB color channel with an increased color range. Gradations look better, color is richer. Ideal for all professional scanning applications. One-pass scanning up to 8.5x14". 1200x600dpi optical resolution (up to 2400dpi through software). 68.7 billion colors! Includes Microtek's scan software, DCR™ color calibration, **full version of Adobe Photoshop!**

#112371 **$2359**

ScanMaker® IISP

One-pass, high quality 600dpi scanner

Fast single-pass 24-bit color scanner captures up to 16.8 million colors at 600x300dpi (1200dpi through software). Perfect for artists and publishers, multimedia and OCR. INCLUDES **Color It!** image editing software from MicroFrontier and **OmniPage Direct** OCR software from Caere. Award-winning quality!

$535 #112393

PC MAGAZINE EDITORS' CHOICE

ScanMaker® II

Affordable high quality 600dpi scanner

Three pass color scanner, scans up to 8.5x14" images in vivid 24-bit color. 600x300dpi resolution (1200dpi through software). Ideal entry level color scanner for home office use, OCR and classroom. INCLUDES **Color It!** image editing software from MicroFrontier and **OmniPage Direct** OCR software from Caere.

$455 #112394

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VIKING MEMORY

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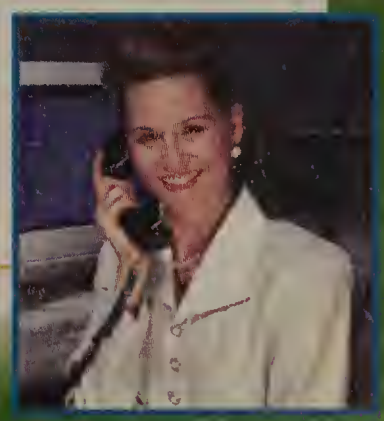

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8100 Systems

8100/80 SuperStation

0 Down! $228 per month

CPU Starting at $2599

$7.40 a day!

- PowerPC 8100/80MHZ
- Internal CD ROM
- 40MB RAM
- 2.1GB internal hard drive
- Extended keyboard
- Apple 17" Trinitron monitor
- Radius Thunder 24 video card
- dsc 12000c, 9600x9600 dpi color flatbed scanner
- TI MicroLaser PowerPro, 600 dpi, 8.5" x 11", 12 ppm printer w/ 2 AppleTalk connectors
- Wacom 12x12 Graphics Tablet
- SuperMicro Extended Services

72 Hour

8100/100 Video Workstation

0 Down! $452 per month

CPU Starting at $3199

$14.85 a day!

- PowerPC 8100/100MHZ
- Internal CD ROM
- 72MB RAM
- 2.1GB internal hard drive
- Extended keyboard
- Radius 21" Trinitron monitor
- Radius Thunder 24 video card
- Radius Video Vision Studio Pro Pak including 4.0GB Fast&Wide disk array w/ Fast&Wide SCSI controller
- Internal SDT-5000 DAT tape drive w/ 1 FREE tape
- SuperMicro Extended Services

8100/110 Ultimate Graphics Workstation

0 Down! $656 per month

CPU Starting at $4199

$21.88 a day!

- PowerPC 8100/110MHZ
- Internal CD ROM
- 136MB RAM
- 4.0GB internal hard drive
- Sony 20SE Trinitron monitor
- Radius Thunder IIGX 1600
- Multifunctional SyOuest 200 /Sony 650 optical w/ SyOuest 200 cartridge, 650MB optical cartridge
- Umax PowerLook 1200 dpi color flatbed scanner w/full Photoshop
- GCC XL 808 Laser Printer, 800x 800 dpi, 11"x17", Ethernet
- Two GCC toner cartridges
- Wacom 12x18 Graphics Tablet Electrostatic
- SuperMicro Extended Services

Optical SyQuest + CD

7100 Systems

7100/66 ValueStation

0 Down! $185 per month

CPU Starting at $2199

$5.08 a day!

- PowerPC 7100/66MHZ
- Internal CD ROM
- 40MB RAM
- 540MB hard drive
- Extended keyboard
- External SyOuest 88c w/ FREE cartridge
- Sony 17SF Trinitron monitor
- dsc 6000c, 2400x2400 dpi scanner w/ PS LE
- Radius Thunder 24 video card
- TI Pro 600, 600 dpi, 8 ppm printer w/ 2 AppleTalk connectors
- Wacom 6x8 Artz Graphics Tablet
- SuperMicro Extended Services

7100/80 Paperless Office

0 Down! $239 per month

CPU Starting at $2399

$7.85 a day!

- PowerPC 7100/80MHZ
- Internal CD ROM
- 40mb RAM
- 1.0GB hard drive
- Extended keyboard
- Sony 20SE Trinitron monitor
- Radius Thunder 24 video card
- Globalvillage Teleport Gold fax modem
- Umax UC630 scanner w/ page feeder and OCR software
- Pinnacle Micro CDR-1000 CD-ROM Recorder
- SuperMicro Extended Services

LOW Prices

7100/80 Designstation

0 Down! $264 per month

CPU Starting at $2599

$8.67 a day!

- PowerPC 7100/80MHZ
- Internal CD ROM
- 72MB RAM
- 1.0GB hard drive
- Extended keyboard
- Turbo SyOuest 200 external w/ 1 FREE cartridge
- Sony 20SE Trinitron monitor
- Radius Thunder 24 video card
- dsc 8000c, 3600x3600 dpi scanner w/ full Photoshop
- TI MicroLaser Pro 600 PS23, 600 dpi, 8 ppm printer w/ 2 AppleTalk connectors
- Wacom 12x12 Graphics Tablet
- SuperMicro Extended Services

Knowledgeable Technical Support

6100 Systems

6100/66 Data Entry Workstation

0 Down! $95 per month

CPU Starting at $1499

$3.12 a day!

- PowerPC 6100/66MHZ
- Internal CD ROM
- 24MB RAM
- 540MB internal hard drive
- Extended keyboard
- Apple 15" Trinitron monitor
- TI MicroLaser Pro 600, 600 dpi, 8 ppm printer w/ 2 AppleTalk connectors
- SuperMicro Extended Services

72 Hour

6100/60 DTP Solution

0 Down! $159 per month

CPU Starting at $1399

$5.22 a day!

- PowerPC 6100/66MHZ
- Internal CD ROM
- 24MB RAM
- 540MB internal hard drive
- Extended keyboard
- External SyOuest 88c w/ cartridge
- Sony 17SF Trinitron monitor
- Radius 24xk video card
- dsc 6000c, 2400x2400 dpi color flatbed scanner w/Transparency and Photoshop LE
- TI Pro 600 printer w/ 2 AppleTalk connectors
- Wacom 6x8 Artz Graphics Tablet
- SuperMicro Extended Services

LOW Prices

System Specials

Every SuperMicro system is completely assembled and tested before shipping—all ready to run.

CPU/XKey/Mouse	Monitor/Card	Cash	Lease	
8100/110/16/2.0GB/CD	**None/Thunder 24**	**$5299**	**$121**	SALE
8100/110/72/2.0GB/CD	Sony 17"/Thunder 24	$8049	$184	
8100/110/136/4.3GB/CD	**Sony 20"/Thunder 24**	**$12,228**	**$280**	SALE
8100/80AV/72/540/CD	Sony 17"/Thunder 24	$7499	$171	
7100/66/24/1.0GB	Sony 17"/Thunder 24	$4699	$107	
7100/80/40/700/CD	Sony 20"/Thunder 24	$7295	$167	
6100/66/24/540	14" hi-res color monitor	$2575	$58	
6100/60/8/350	**14" hi-res color monitor**	**$1799**	**$44**	SALE

Monthly Specials

Fully Loaded 8100/110 $5299!

- PowerMac 8100/110 CPU
- 16MB RAM
- 2GB hard drive
- Internal dual-spin CD-ROM
- Radius Thunder 24 series IV video card

LOW Prices

#1 in Tech Support

While they last!

Scanners

ScanMaker IIHR $828!

- 24-bit color
- 600 dpi resolution
- Includes color calibration system

MICROTEK

Scanner	Description	Price	
dsc 6000c	600 dpi flatbed w/PS LE	$449	
dsc 8000c	800 dpi flatbed w/PS LE	$549	
dsc 12000C w/trans	**1200 dpi flatbed w/PS LE**	**$949**	SALE
Agfa StudioScan II	400 dpi flatbed	$829	
Agfa Arcus II w/trans	1200 dpi flatbed	$2579	
ScanMaker III	1200 dpi flatbed	$2449	
ScanMaker IIHR	**600 dpi flatbed**	**$828**	SALE
Umax PowerLook	**1200 dpi flatbed**	**$2449**	SALE
Nikon CoolScan	2700 dpi slide	$1389	
Polaroid SprintScan	2700 dpi slide	$1859	
StudioScan II adapter	transparency upgrade	$379	
Microtek adapter	transparency upgrade	$519	

Printers

TI MicroLaser Pro 600 PS23 $1189!

Texas Instruments

- 600 dpi camera ready output
- 8.5" x 11" print size
- 500 sheet capacity

Model	Resolution	Size	Price	
TI MicroLaser Pro 600 PS23	**600x600**	**8.5"x14"**	**$1189**	SALE
TI MicroLaser Pro E	600x600	8.5"x14"	$1365	
TI MicroLaser PowerPro	600x600	8.5"x14"	$1629	
Primera Pro Color	300x600	8.5"x11"	$1499	
Primera Pictura 310 Color	300x300	12"x18"	$3899	
Epson StylusColor	300x300	8.5"x11"	$529	
GCC XL 608	600x600	11"x17"	$2189	
GCC XL 808	**800x800**	**11"x17"**	**$2719**	SALE

Graphics Tablets

Wacom SD-420E 12"x12" tablet $487!

- 1016 lpi resolution
- Pressure-sensitive stylus with no cord or batteries!

WACOM

Model	Size	Price	
Wacom ArtZ	6" x 8"	$279	
Wacom SD-420E	**12" x 12"**	**$487**	SALE
Wacom SD-310E	12" x 18"	$699	
Wacom UD-1825	18" x 25"	$1999	
Calcomp Drawing Slate II	12" x 12"	$249	

Microsoft Office

Purchase $400 or more and get Microsoft Office 3.0 or Adobe Photoshop 3.0.1 for only $299

Adobe Photoshop 3.0

Monitors

Sony 17SF/Radius Thunder 24 $1479!

Save $200 on a Sony 17SF monitor and Radius Thunder 24 Series IV complete video solution!

- Accurate, 24-bit color
- 1024 x 768 resolution
- Photoshop acceleration

LOW Prices

SONY

Monitor	Resolution	Price	
Sony 1425	14in, 25mm, 1024x768	$321	
Sony 15SF	15in, 25mm, 1024x768	$439	
Sony 17SF	**17in, 25mm, 1024x768**	**$859**	SALE
Sony 20SE	20in, 25mm, 1280x1024	$1889	
NEC 17XE	17in, 25mm, 1280x1024	$979	
Apple 15	15in, 25mm, 1024x768	$399	
Apple 17	17in, 1024x768, .26mm	$799	

Fax Modems

LOW Prices

DSC Turbo FaxModem $98!

- 14,400 bps data transmission rate
- 100% AT&T compatible
- Free fax software included!

dsc

Model	Description	Price	
dsc Turbo FaxModem	**External, 14,4K bps**	**$98**	SALE
US Robotics Sportster 28.8 V.34	External, 28.8K bps	$248	
SupraFAXModem 28.8 MC V.34	External, 28.8K bps	$219	
GlobalVillage TelePort Gold II	External, 14,4K bps	$123	
GlobalVillage TelePort Platinum	**External, 28.8K bps**	**$226**	SALE

Video Cards

Radius Thunder 24 $799!

- 24-bit color at 1152 x 870 dpi!
- Photoshop acceleration

radius

Video Cards	Resolution	Price	
Radius Spectrum 24 Series V	1024x768	$399	
Radius Thunder 24	**1152x870**	**$799**	SALE
Radius Spectrum Power, 1152	1152x870	$1138	
Radius Thunder II Series IV GX 1152	1152x870	$1819	
Radius Thunder II Series IV GX 1360	1360x1024	$2339	
Radius Thunder II Series IV GX 1600	**1600x1200**	**$2769**	SALE

44MB Cartridges $29!

SyQuest Cartridges

LOW Prices

Cartridges		Price
270MB Cartridges	(5 + or with drive purchase)	$56
200MB Cartridges	(5 + or with drive purchase)	$70
105MB Cartridges	(5 + or with drive purchase)	$50
88MB Cartridges	(5 + or with drive purchase)	**$38 /45** SALE
44MB Cartridges	(5 + or with drive purchase)	**$29 /39** SALE

Optical Cartridges

3.5" Optical	Price
Sony 128MB	$29
dsc 128MB	**$17** SALE
dsc 230MB	$32
Komag 128MB	$24
Komag 230	$28
Sony 230	$39

5.25" Optical	Price
Sony 650MB	$75
3m 650MB	$75
dsc 650MB	$64
Komag 650	$69
Tahiti II 1GB	$159
Komag 1.0GB	$81
dsc 1.3GB	$79
Komag 1.3GB	**$83** SALE
Sony 1.3GB	$95

Tapes

Cartridges	Price
Sony DAT 90m	$12
Sony DAT 120m	**$24** SALE
Maxell 8mm 112m	$21
Sony 6250	$25
Sony 6525	$29

Save on Komag Optical Cartridges!

Get high performance, quality and cost effective storage from the world's leader in storage technology—Komag!

Komag 1.3GB Cartridges $83!

5.25"	Price
600/650MB	$69
1.0GB	$81
1.2/1.3GB	**$83** SALE

3.5"	Price
128MB	**$24** SALE
230MB	$28

- Compatible with all magneto optical drives
- Made in the USA
- Every cartridge fully tested and certified
- LIFETIME Warranty

Hard Drives

NEW!

dsc FWB Hard Disk Toolkit. $59 Value!

dsc Turbo Drives

Now even faster! Turbo models have guaranteed 72-hour replacement *plus* FWB Hard Disk Toolkit—*FREE!*

Turbo IBM 730 MB $310!

Quantum — Quantum Warranty: 2 to 5 Years

Model	Access	Internal	External	dsc Turbo
85MB Go	Daytona	17ms	$199	$319	$344
256MB Go	Daytona	17ms	$185	$305	$330
341MB Go	Daytona	17ms	$289	$409	$434
512MB Go	Daytona	17ms	$375	$495	$520
42MB	Maverick	17ms	$79	$139	$164
85MB	**Maverick**	**17ms**	**$110**	**$170**	**$195** SALE
270MB	Maverick	14ms	$140	$200	$225
365MB	Lightning	11ms	$155	$215	$240
540MB	Maverick	14ms	$195	$255	$280
540MB	Lightning	11ms	$205	$265	$290
730MB	Lightning	11ms	$215	$275	$300
1.0GB	Empire	9.5ms	$509	$569	$594
1.4GB	Empire	9.5ms	$659	$719	$744
2.1GB	**Atlas**	**9.5ms**	**$879**	**$939**	**$964** SALE
4.2GB	Atlas	9.5ms	$1369	$1429	$1454

Seagate — Seagate Warranty: 5 Years

Model	Access	Internal	External	dsc Turbo
1.0GB	Hawk 1	9ms	$519	$579	$629
2.1GB	Hawk 2LP	9ms	$839	$899	$924
2.1GB	Barracuda 2LP	8ms	$1029	$1089	$1114
2.1GB	Barracuda 2W*	8ms	$1129	$1189	$1239
4.3GB	**Hawk 4LP**	**9ms**	**$1329**	**$1389**	**$1439** SALE
4.3GB	Barracuda 4LP	8ms	$1479	$1539	$1589
4.3GB	Barracuda 4W*	8ms	$1579	$1639	$1689
3.4GB	Elite 3	10ms	$1935	$2035	$2085
9.1GB	**Elite 9**	**11ms**	**$2829**	**$2889**	**$2914** SALE

IBM — IBM Warranty: 5 Years

Access	Internal	External	dsc Turbo
160MB	12ms	$140	$200	$225
364MB	12ms	$169	$229	$254
540MB	12ms	$199	$259	$284
730MB	**11ms**	**$225**	**$285**	**$310** SALE
1.0 GB	11ms	$499	$559	$584
2.0 GB	11ms	N/A	$799	$824

LOW Prices

FUJITSU — Fujitsu Warranty: 5 Years

Access	Internal	External	dsc Turbo
540MB	**9ms**	**$199**	**$259**	**$284** SALE
1.2GB	9ms	$509	$569	$594
2.1GB	9ms	$889	$949	$974

For Active Termination, add $29. Additional 50/50 SCSI cables, $15 each.

Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo models include FWB Hard Disk ToolKit and 72-hour warranty repair.

** Fast/Wide drives require ATTO SE IV SCSI interface card at $895*

SyQuest 270MB $400!

- High speed—13ms access time!
- Compact 3.5" format
- Compatible with SyQuest 105 cartridges
- Meets the speed and capacity requirements of image processing and publishing professionals

SyQuest Drives

dsc Turbo-charged SyQuest Drives!

Model	Internal	External	dsc Turbo
SyQuest 270	**$360**	**$400**	**$425** SALE
SyQuest 200	**$345**	**$385**	**$410** SALE
SyQuest 105	$155	$195	$220
SyQuest 88C	$255	$295	$320
SyQuest 44	$125	$155	$180

Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo model includes FWB Hard Disk ToolKit and 72-hour warranty repair.

Tape Drives

Sony SDT-5000 $1019!

- Built in data compression
- 16GB per 120 meter tape
- Low cost, dependable backup

FREE! 72 hour Replacement Guarantee with any tape drive purchase!

Model	Capacity	Size	MacKit	dsc Turbo
Sony SDT-2000	2GB	3.5"HH	$725	$775
Sony SDT-4000	8GB	3.5"HH	$889	$939
Sony SDT-5000	**5-16GB**	**3.5"HH**	**$889**	**$939** SALE
Exabyte 8200	2GB	5.25"FH	$1275	$1350
Exabyte 8500	5GB	5.25"FH	$2175	$2250
Exabyte 8205	**2-5GB**	**5.25"HH**	**$1479**	**$1529** SALE
Exabyte 8505XL	5-10GB	5.25"HH	$2189	$2239

Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo model includes Retrospect and 72-hour warranty repair.

Multifunctional Drives

SyQuest 200 /540MB HD Combo $669!

- Up to 6 devices in the same enclosure!
- Costs less than individual drives
- Quick setup. Only one cable!
- Promotes data security. Just lock it away after hours.

Multifunctional	Price
SyQuest 200 /540MB hard drive	**$669** SALE
Sony SDT 5000 /2.0GB Quantum	$1899
Sony 650MB Optical /SyQuest 200	$1199
Olympus 3.5" optical /Nikon Coolscan	$1899
SyQuest 88c /650MB optical drive	**$1099** SALE
SyQuest 88c /NEC 3X CD ROM /540MB HD	$979
Archive 525 Tape drive /540MB harddrive	$699
NEC 3X CD-ROM /1.3GB optical drive	$1799
4.0GB Quantum HD /Nikon CoolScan	$2679

Includes external drive, 25/50 SCSI Cable, terminator, Mac SW and 72-hour warranty repair.

Optical Drives

Sony 1.3GB $1699!

- High 2.0MB p/s transfer rate
- Economical storage of large color images and digital audio/video data

5.25" Drives	Capacity	Seek	MacKit	dsc Turbo
Sony 650	650MB	19ms	$999	$1049
IBM 650	650MB	27ms	$699	$749
Sony 1.3GB	**1.3GB**	**25ms**	**$1699**	**$1749** SALE
MaxOptix-Tahiti I	650MB/1.3GB	27ms	$799	$849
MaxOptix-Tahiti II	1.0GB	25ms	$799	$849
MaxOptix-Tahiti III	1.3GB	25ms	$1989	$2039
Ricoh 650EX	650MB	25ms	$1499	$1549
Ricoh 1.3GB Turbo	1.3GB	24ms	$1999	$2049

Olympus 128MB $389!

- Convenient 3.5" format
- Optical technology for years of reliable storage

3.5" Drives	Capacity	Seek	MacKit	dsc Turbo
Olympus 128	**128MB**	**35ms**	**$389**	**$439** SALE
Fujitsu-230	230MB	30ms	$569	$594
Most-256	256mb	37ms	$895	$945

Includes external drive, 25/50 SCSI Cable, MAC SW and terminator. Turbo model includes FWB Hard Disk ToolKit and 72-hour warranty repair.

CD-ROM Drives

Toshiba 3501 $375!

- Quad speed
- Supports PhotoCD, Multisession and MPC
- Includes FWB CD ToolKit FREE!

Model	Price
Toshiba 3501 QuadSpeed	**$375** SALE
NEC MultiSpin 2V	$189
NEC MultiSpin 4Xi	**$369** SALE
NEC MultiSpin 4Xe	$459
CD-ROM Special (with CD-ROM drive purchase)	$79

CD ROM Recorders

PM CDR-1000 $1799!

Model	Price
PinnacleMicro CDR-1000	**$1799** SALE
Yamaha 4-Speed CD-ROM Recorder	$3369

Disk Arrays

dsc 4.0GB Array $2569!

- Supports Raid Levels 0 and 1 for disk mirroring and striping
- Speeds up all applications—including VideoVision Studio!

Model	Description	Array	VideoVision
dsc 2.0GB Array	(2 x 1.0GB drives)	$1319	N/A
dsc 4.0GB Array	**(2 x 2.0GB drives)**	**$2569**	**$2899*** SALE
dsc 8.0GB Array	**(2 x 4.0GB drives)**	**$2999**	**$3699*** SALE
dsc CD-ROM Array	**(6 x Quadspeed)**	**$1299**	**N/A**

Includes external disk array, SCSI Cable, MAC SW and terminator.
**VideoVision Studio support requires ATTO Fast/Wide interface; add $895*

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Ship it 5 lbs. 5 bucks

230MB Optical.....$399

With purchase of 10 cartridges.

28.8 v.34 Modem ...$139

With software & cable.

SQ270 .....$56

Hot storage solution from SyQuest.

D I S T R I

UMAX *The Magic of Color*

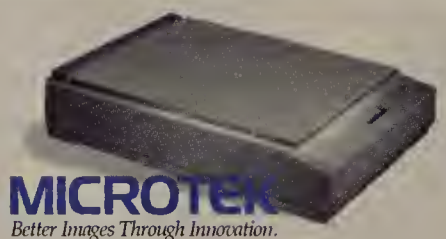
Business Card Reader 219
Vista T630 499
Vista S6.....599
Vista S8.....729
UC1260 819
PowerLook 2199
Transparency Adapter 399

Business Card Reader $219

Wacom

ArtZ.....269
ArtPad 148
UD 12x12 RM 509
Painter Bundle 289

Painter Bundle $289



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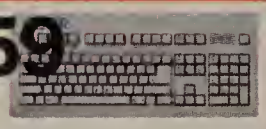

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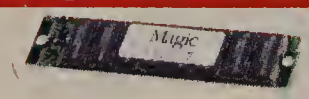

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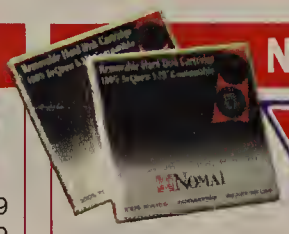

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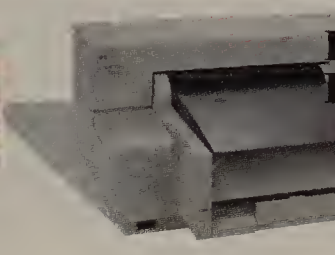

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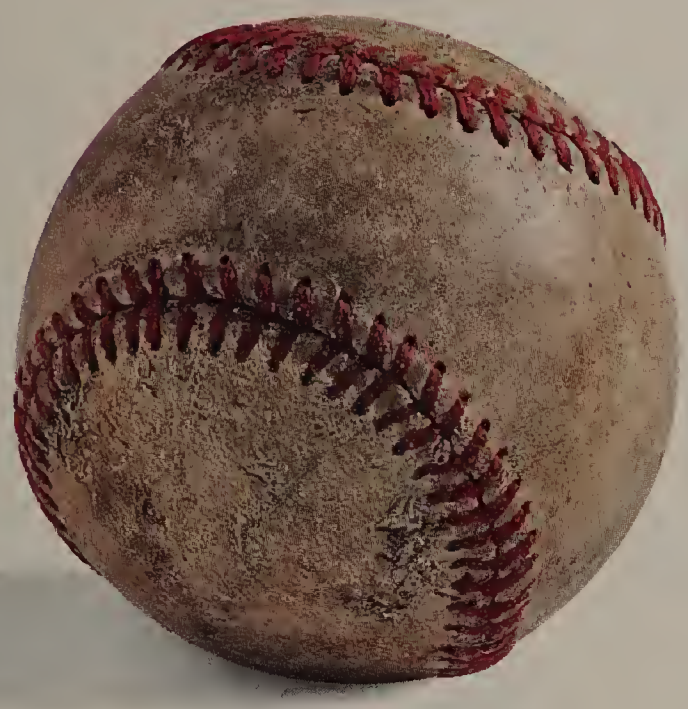

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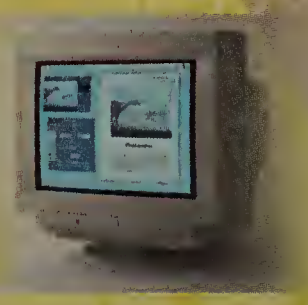

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	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
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LPS	340 MB	12 ms	4500	128K	2 Year	169	229
Trailblazer	420 MB	11 ms	4500	128K	3 Year	185	245
DSP3053	535 MB	9.5 ms	5400	512K	5 Year	220	280
Maverick	540 MB	14 ms	3600	128K	2 Year	215	275
Fireball	540 MB	10 ms	5400	128K	3Year	220	280
Lightning	730 MB	11 ms	4500	128K	2 Year	255	315
Trailblazer	850 MB	11 ms	4500	128K	3 Year	270	330
Fireball	1080 MB	10 ms	5400	128K	3 Year	475	535
Grand Prix	2100 MB	9.5 ms	5400	512K	5 Year	915	975
Atlas	2.1 GB	9 ms	7200	1024K	5 Year	920	990
Grand Prix	4200 MB	8.6 ms	7200	512K	5 Year	1155	1215
Atlas	4.3 GB	12 ms	7200	512K	5 Year	1475	1535

	Capacity	Size	Access	Cache	Warranty	Int.	Ext.
Daytona	256 MB	2.5"	17ms	128K	1 Year	225	325
Daytona	341 MB	2.5"	17ms	128K	1 Year	295	395
Daytona	514 MB	2.5"	14ms	128K	1 Year	415	515

MICROPOLIS MICROPOLIS

	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
M4221	2.1 GB	8.5 ms	7200	512K	5 Year	935	995
M1936	3.6 GB	11 ms	5400	512K	5 Year	1225	1325
M43243	4.3 GB	8.5 ms	7200	512K	5 Year	1335	1395
M1991	9.0 GB	11 ms	5400	512K	5 Year	2170	2270
M4221W	2.1 GB	8.5 ms	7200	512K	5 Year	1025	1085
M3243W	4.3 GB	8.5 ms	7200	512K	5 Year	1435	1495
M1991W	9.0 GB	11 ms	5400	512K	5 Year	2270	2370
M4221AV	2.1 GB	8.5 ms	7200	512K	5 Year	985	1045
M1936AV	3.6 GB	11 ms	5400	512K	5 Year	1275	1375
M3243AV	4.3 GB	8.5 ms	7200	512K	5 Year	1425	1485
M1991AV	9.0 GB	11 ms	5400	512K	5 Year	2265	2365
M4221WAV	2.1 GB	8.5 ms	7200	512K	5 Year	1075	1135
M3243WAV	4.3 GB	8.5 ms	7200	512K	5 Year	1525	1585
M1991WAV	9.0 GB	11 ms	5400	512K	5 Year	2365	2465

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	Capacity		Seek	RPM	Cache	Warranty	Int.	Ext.
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Hawk 4	4.2 GB	ST15230N	9ms	5400	512K	5 Year	1325	1385
Barracuda	2.4 GB	ST32550N	8ms	7200	1024K	5 Year	1045	1105
Barracuda	4.2 GB	ST15150N	8ms	7200	1024K	5 Year	1455	1515
Barracuda	2.4 GB	ST32550W	8ms	7200	1024K	5 Year	1095	1155
Barracuda	4.2 GB	ST15150W	8ms	7200	1024K	5 Year	1475	1535
Elite	9 GB	ST410800N	11ms	5400	512K	5 Year	2950	3050

FUJITSU FUJITSU FUJITSU FUJITSU FUJITSU

	Capacity	Seek	RPM	Cache	Warranty	Int.	Ext.
M2684	530 MB	10ms	5400	512K	5 Year	220	280
M1606	1.0 GB	10ms	5400	512K	5 Year	495	555
M2915	2.1 GB	10ms	5400	512K	5 Year	925	985

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270 MB	SQ3270	13.5ms	3200	420	480

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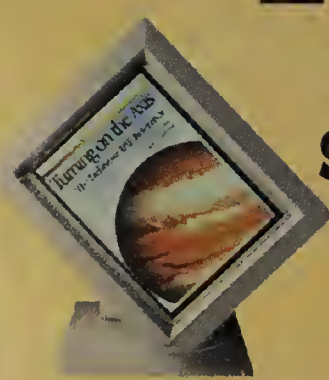

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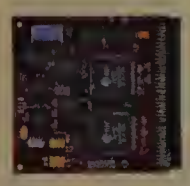

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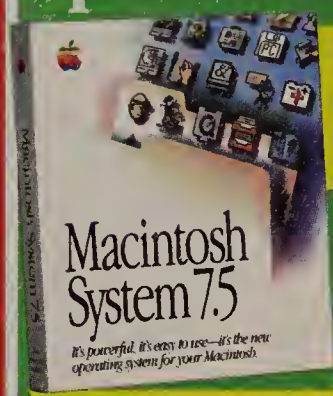

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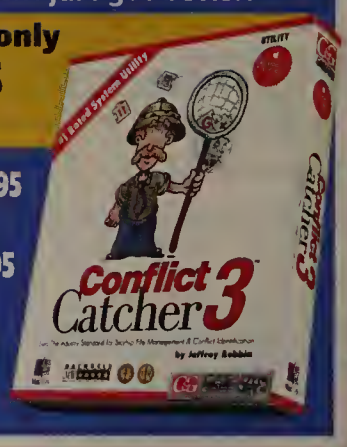

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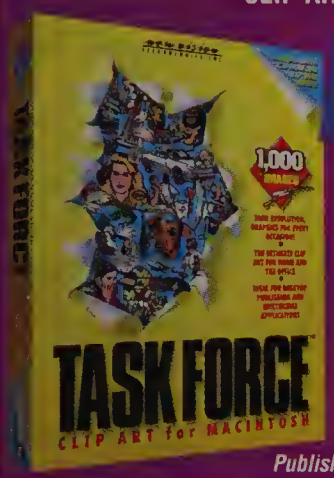

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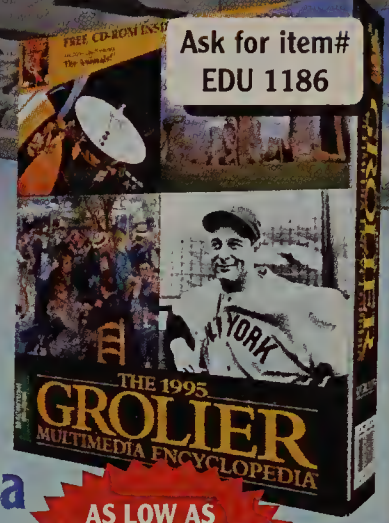

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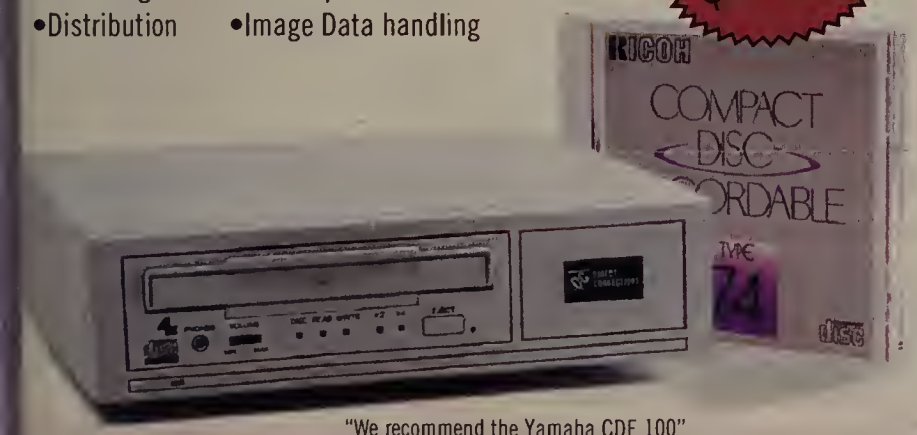

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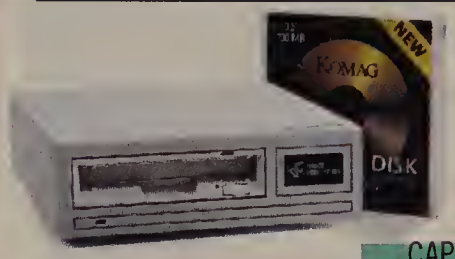

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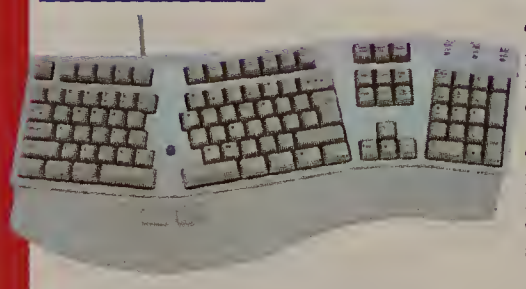

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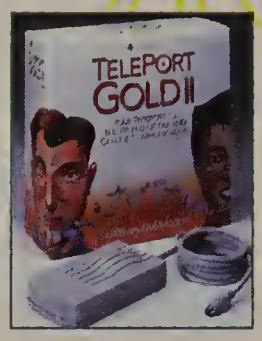

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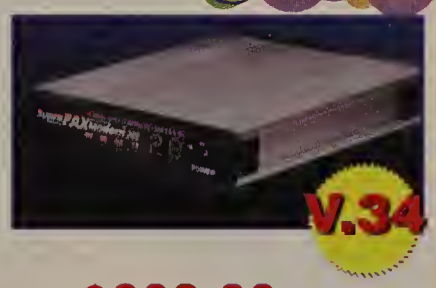

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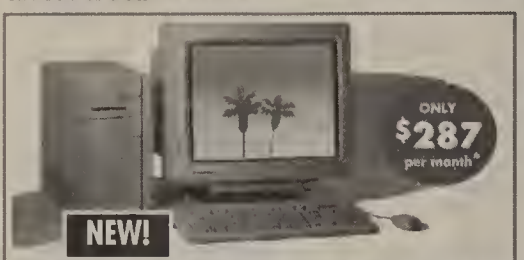

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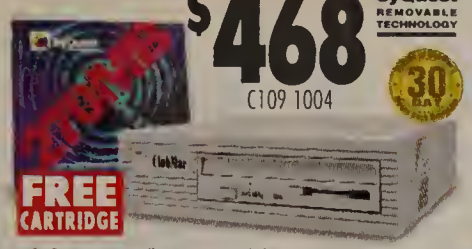

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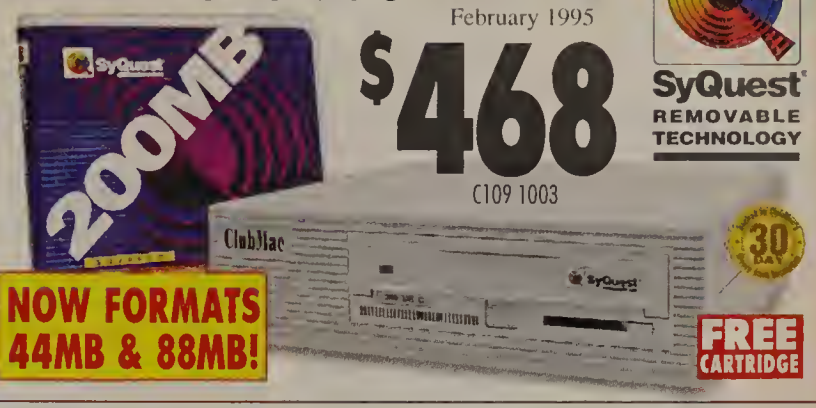

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Daytona	514MB	Q030 1002	$399	C109 1109	$519

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Trailblazer NEW	420MB	C109 1204	$189	C109 1205	$249
Lightning	540MB	C109 1150	$219	C109 1100	$279
Lightning	730MB	C109 1154	$259	C109 1102	$319

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Model	Capacity	Part No.	Internal	Part No.	External
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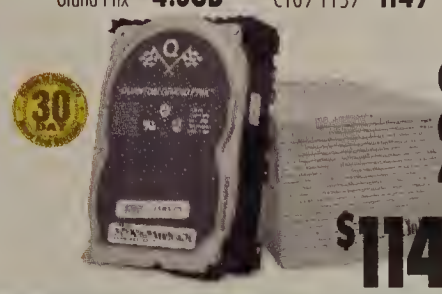
Atlas	2.1GB	C109 1112	$979	C109 1111	$1039
Grand Prix	4.3GB	C109 1159	$1149	C109 1108	$1209



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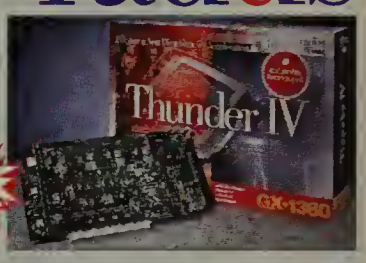

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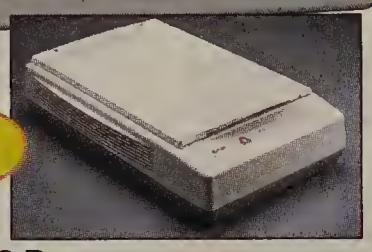

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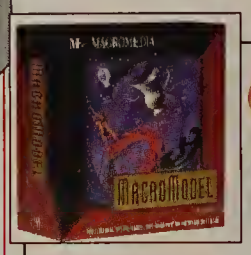

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1177	Multiscan CPD-1425	$329.98

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7865	20GS 20" Monochrome	$794.98
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6548	Intellicolor 20e Display	$1,899.00
2647	Precision View 17"	$849.00
5100	SuperMatch 17T	$839.00
5515	SuperMatch 21TXL	$2,008.00

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3146	NEC MultiSync 2V 14"	$327.98
3147	NEC MultiSync 3V 15"	$466.98
9719	NEC XE 21 21" Color Mtr	$1,978.98
9717	NEC XE15 15" Color Mtr	$537.98
9718	NEC XE17 17" Color Mtr	$996.98
9720	NEC XP 15 15" Color Mtr	$658.98
9721	NEC XP 17 17" Color Mtr	$1,235.00
9722	NEC XP 21 21" Color Mtr	$2,446.00

Raster Ops

3976	ClearVueColor 20T Monitor	$1,349.00

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2427	EAsyColor 24/1152 Accelerated Graphics	$998.00
2428	EAsyColor 24/1360 Accelerated Graphics	$1,429.00
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3820	LapisColor 16 for LC	$309.00
3849	LapisColor 16 Nubus (7")	$309.00

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166	Turbo 601 100Mhz for IIvi, vx P600	$1,739.00
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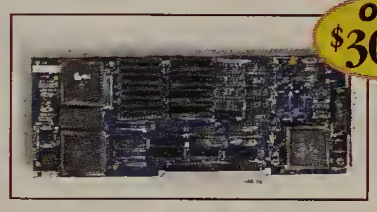

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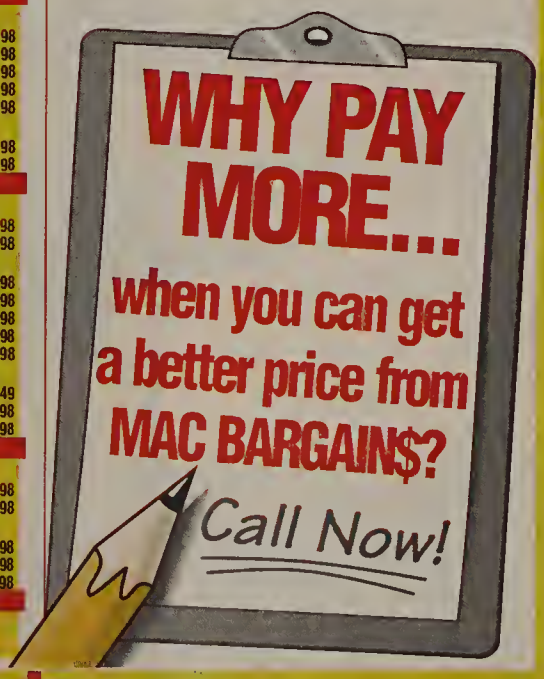

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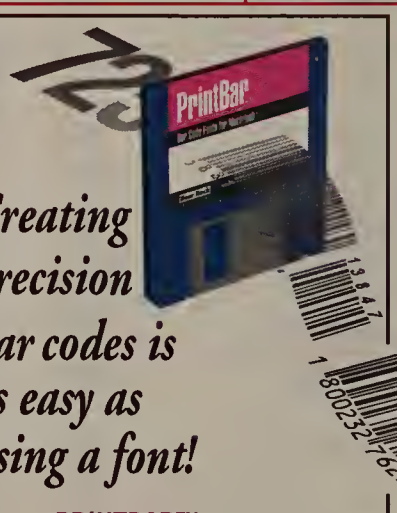

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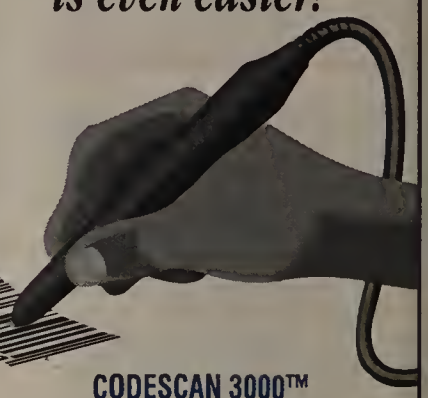

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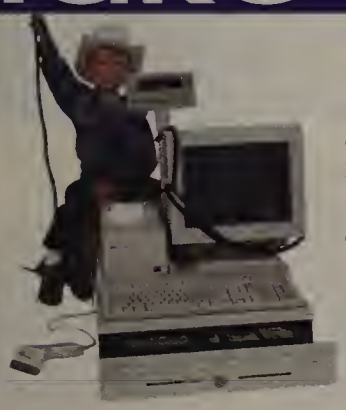

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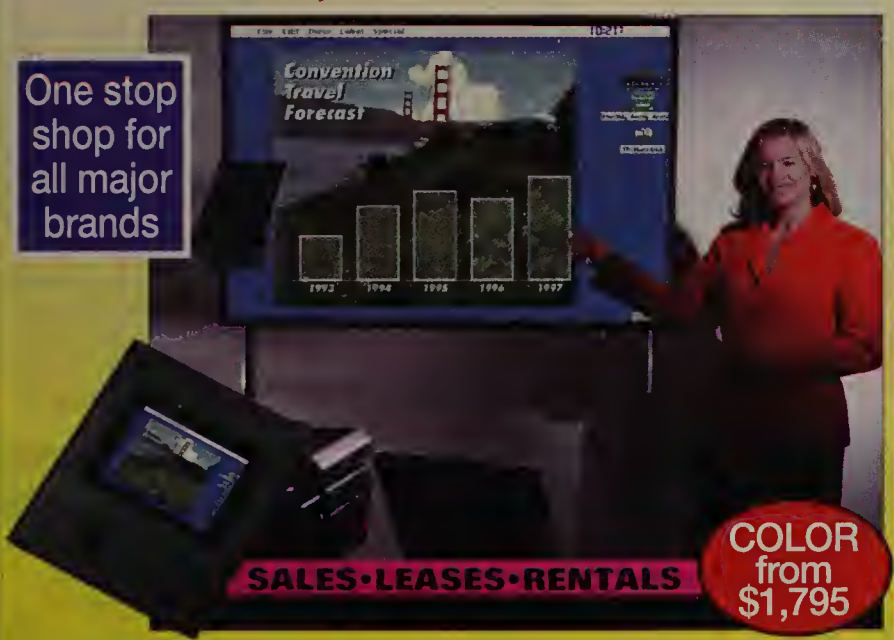

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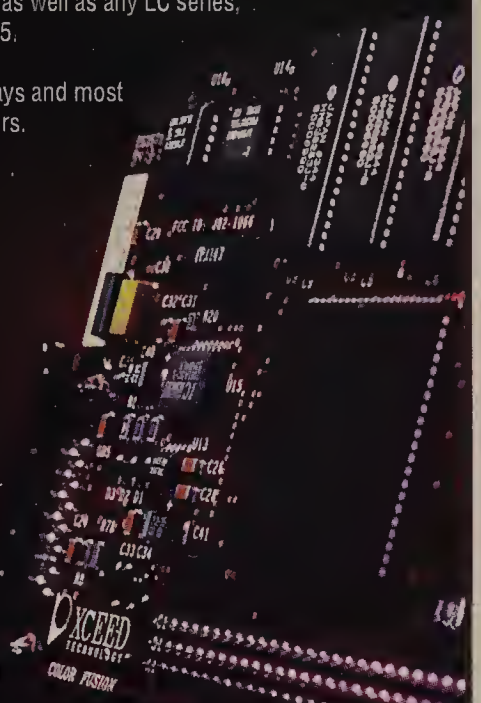

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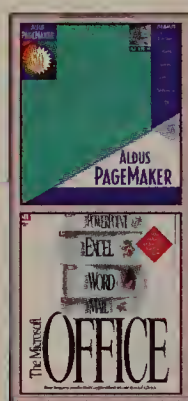

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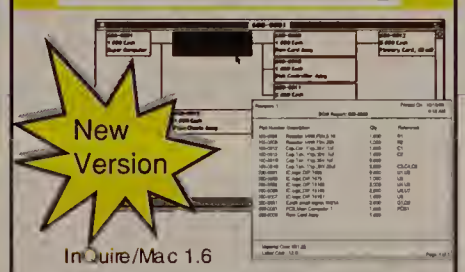

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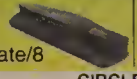

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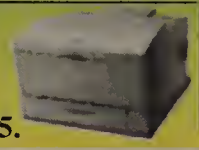

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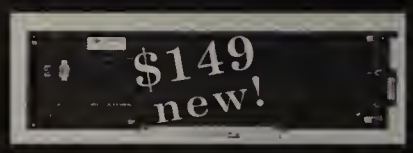

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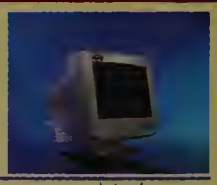

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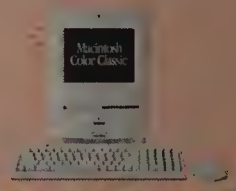

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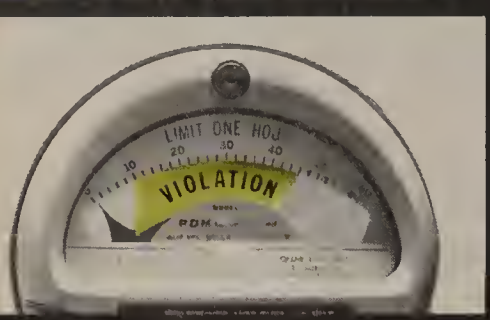

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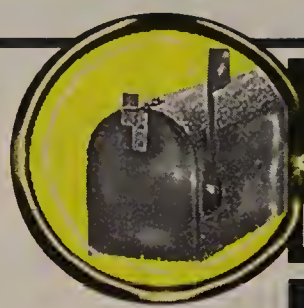

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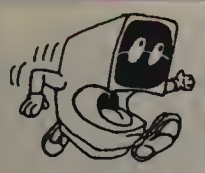

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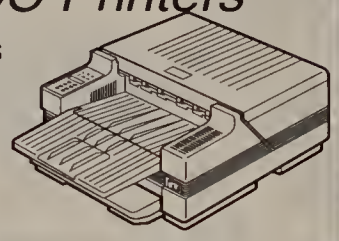

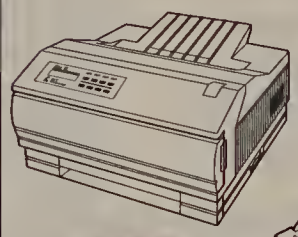

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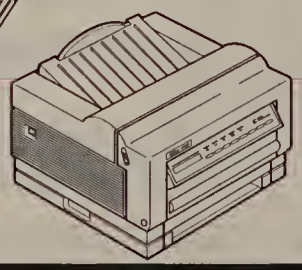

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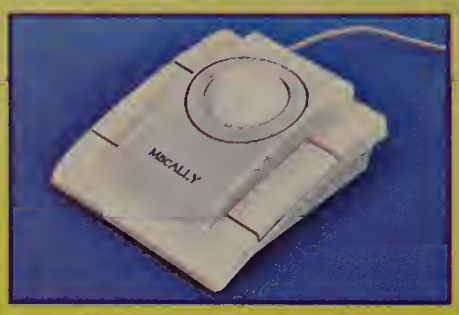

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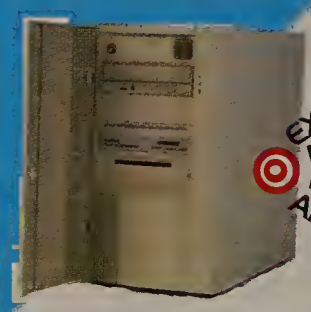

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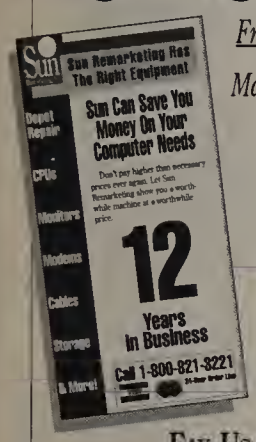

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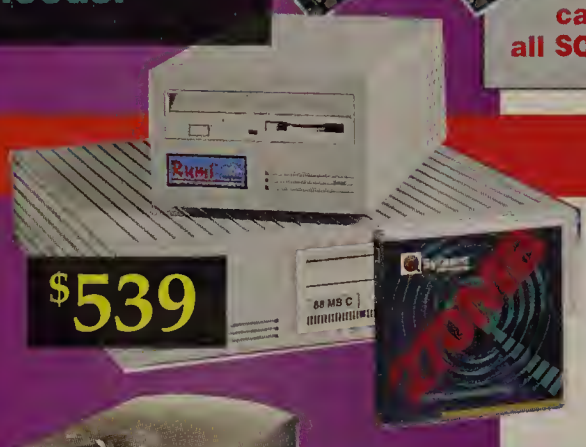

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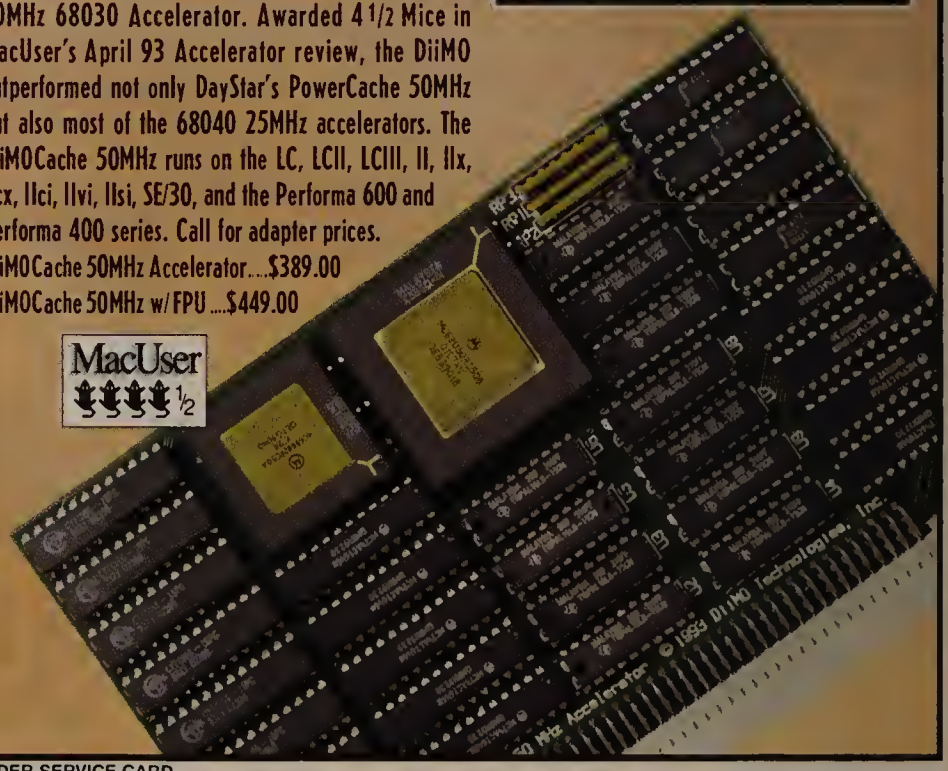

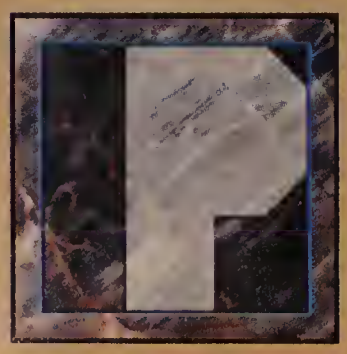

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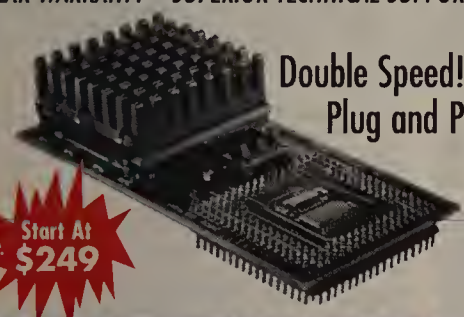

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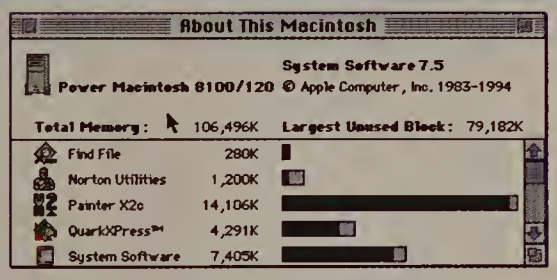

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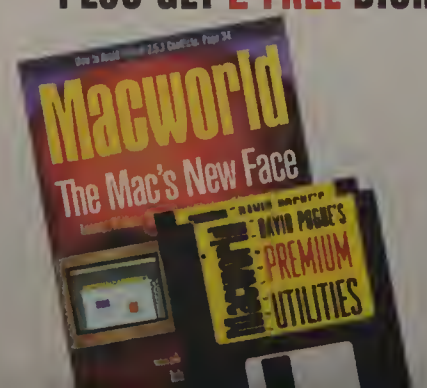

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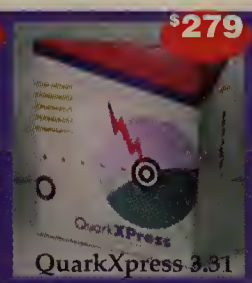
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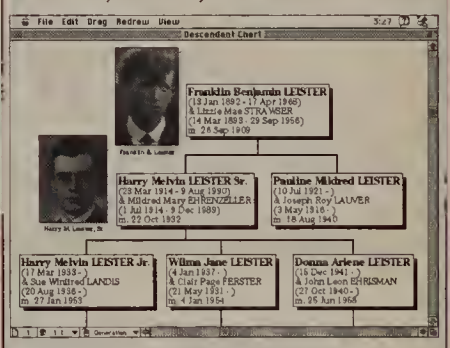

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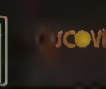

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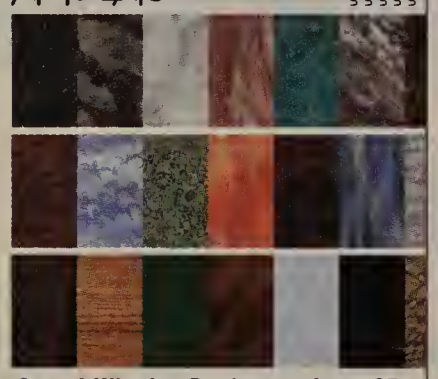

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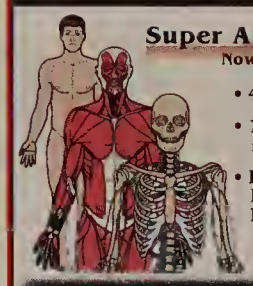

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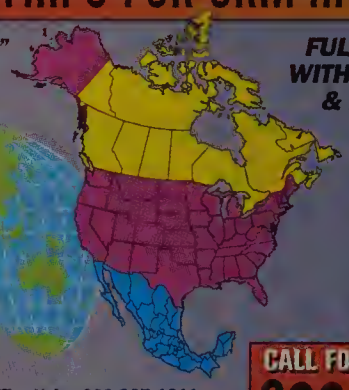

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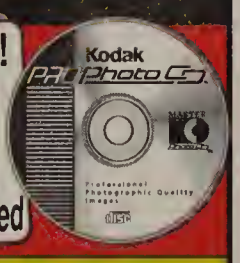

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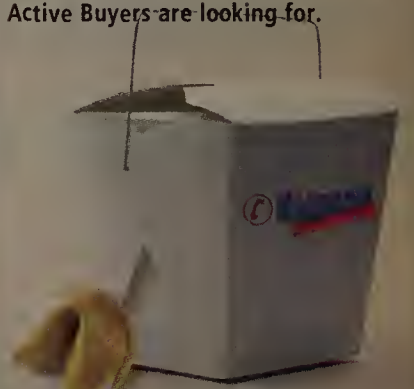

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WISE GUY

BY GUY KAWASAKI

"Sparkles"

The six-point approach to end Macaholism

NOT SURPRISINGLY, MY MAY column ("The Mac Attack Test") produced a downpour of E-mail requesting that I write a column about ending Macintosh addiction. After the 50th message or so, I figured I had a moral obligation to write it. I was going to call this column the 12-step approach, but a reader told me that 12 points would be more typographically correct. Then, because 6 points is just about the smallest font you can read on a Macintosh screen, I decided to cut the number of steps in half.

Confession Is Good for the Mole

Point 1: Confess your powerlessness. Admitting that you've turned into a Macintosh mole is the start to getting cured. Reader example: "One day at my middle school, one of the girls in the Mac lab was getting cold and asked permission to close the window. In an irritated tone of voice, I told her to 'click in the close box.' At this point I realized that maybe I needed to reorder my priorities."—**johna17@aol.com**

Point 2: Take an inventory of your documents to see if they are richer than your life. You should use no more than two fonts per document and one graphic element per page. With the time savings, recapture your life with your spouse and kids. Reader example: "The last time my husband and I made love I found myself whispering in his ear seductively, 'Hey big boy, want to make an alias with me?'" (I wonder what her documents look like.) —**carolyn_curtis@fc1.glfn.org**

Point 3: Make a list of the people you've harmed and then ask them for forgiveness. The length and variety of people on the list will astound you. Ask your spouse or kids, "What is the most important thing I could do for you?" If they say, "Use your Macintosh less," you're convicted. Reader examples: "I have begun to refer to my children as extensions and yesterday told my husband to 'load the little INITs in the car.'"—**carolyn_curtis@fc1.glfn.org** "Recently my daughter said I like the computer more than I like her. Can you have sibling rivalry if one of them is a machine?"—**pattyinfo@aol.com**

Brats and Schmexperts

Point 4: Cut online time. Reader example: "You convince yourself that you absolutely must have E-mail to save time, then find yourself spending even more time finding people to communicate with."—**mmiles8124@aol.com** To cut online time, first consolidate the number of online services you're on to two, and second, limit E-mail and chatting.

The best way to accomplish the second and harder step is to imagine that you're spending hours of your time with grouchy schmexperts, and 16-year-olds who think they can run Apple even

though they can't keep their rooms clean. (Actually, this is exactly what you're doing.) As a rule of thumb, when you consider getting a dedicated phone line for your modem, you're spending too much time online.

Point 5: Carry this message to others. Now that you know how to reduce or repair Macintosh addiction, you have a moral obligation to help others. Reader anti-example: "My girlfriend is waiting for the next issue to see if you write the 12-step method for kicking the Mac habit. I admit I am a Macaholic, but I can't and won't stop the endless nights. Please, for the sake of probably half the Mac users, don't publish that article; my girlfriend and I are sure many Mac users' significant others would love to get their hands on it. Save us all!"—**mike39890@aol.com**

Macintosh: The Next Generation

Point 6: Protect the next generation if you can't save your own. Reader example: "As two adult members of a Mac-committed family, we started our three-year-old daughter, Maria, on a Performa with Kid Pix. She loved it, particularly the paintbrush, which sprays out circles of varying sizes and colors, which she dubbed sparkles. Not long afterwards, we were woken in the middle of the night by cries and screams from Maria's room: 'I can't find the sparkles! I can't get to the sparkles!' She was sound asleep, dreaming, but frustrated.

"Dad tried to rock her and comfort her, but Mom knew better. I sat down on the floor next to her bed and said, 'Take the mouse and point the arrow to the paintbrush over on the side of the screen. Now move the arrow down to the bottom of the screen.' I talked her through finding the sparkles, and she sighed happily and fell back into a deeper sleep."—**heather.williams@williams. edu**

Up to You

This is the best I can do to help you quit the Macintosh habit. The rest is up to you because the key to quitting any addiction is that you want to. Do you want to? **m**

GUY KAWASAKI's views are his own and only sporadically represent those of *Macworld*. He has investments in America Online, Apple, Bit Jugglers, Bookmaker, Global Village Communication, and Intuit. He is the president of Fog City Software, the creator of Claris Emailer. He can be reached at **kawasaki@radiomail.com**, or on the Web at **http://www.umsl.edu/~sbmeade/macway**

STEVE CAMPBELL

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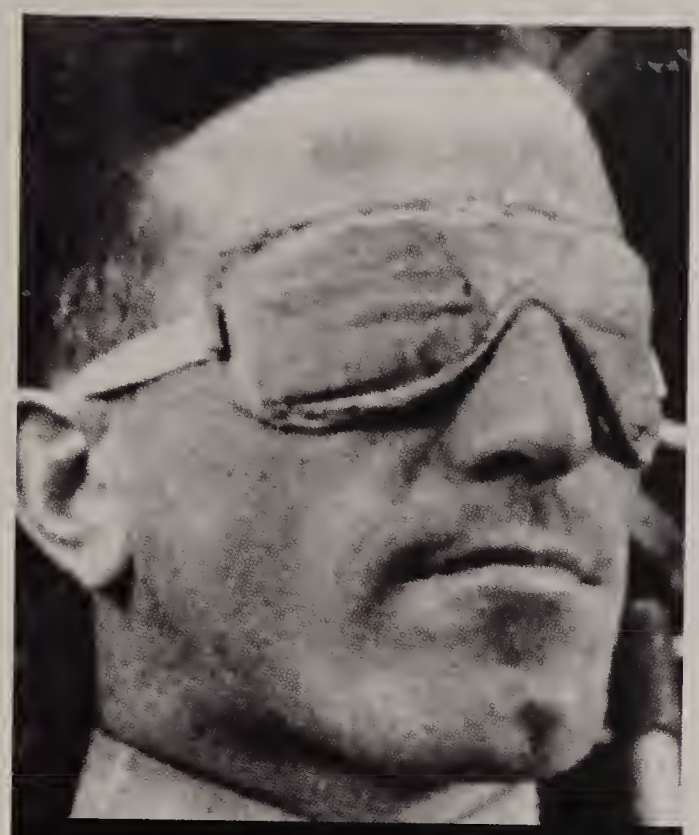
PUSHING
THE
ENVELOPE.
AND THEN
THERE'S
RIPPING A
HOLE
THROUGH IT.



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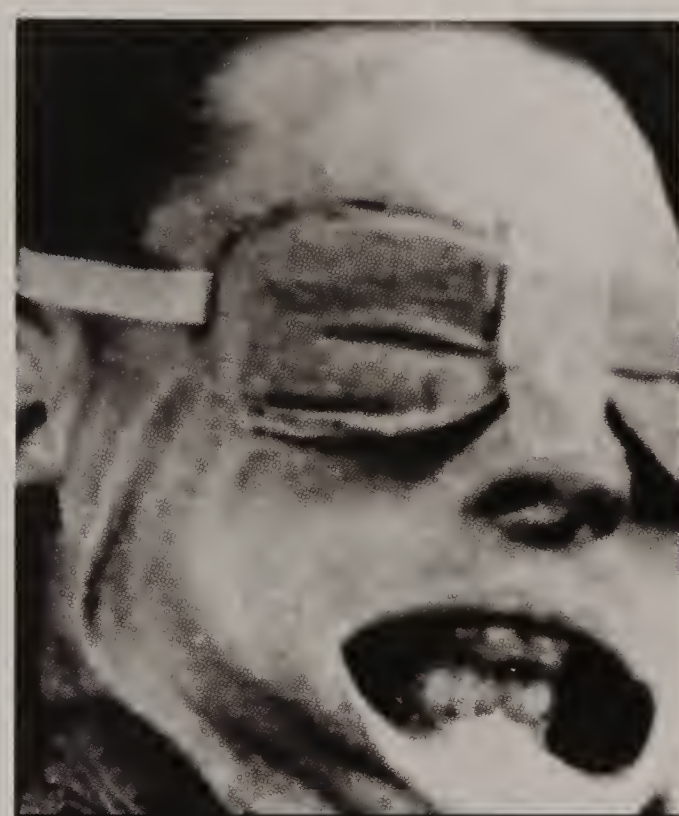

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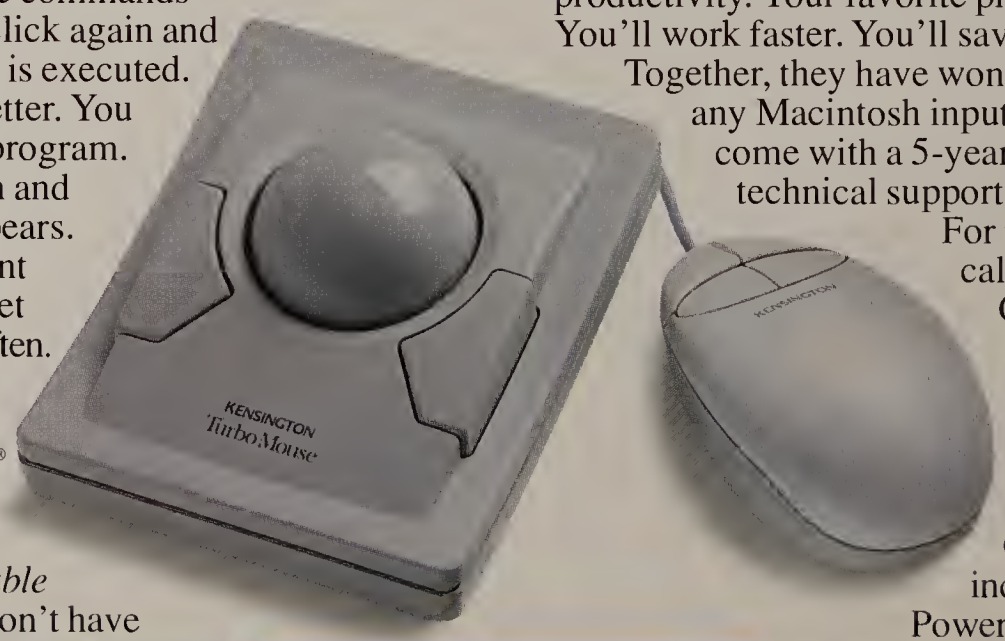

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